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11/4

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DAYS	TIME	PLACE
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Leon V. Quigley, Bakelite Corp.

"CHEMICALS IN THE PLASTICS INDUSTRY"
Bradford S. Covell, Arthur D. Little, Inc.

"SYNTHETIC RESIN FINISHES"
Arthur J. Norton, General Plastics, Inc.

"CELLULOSE ACETATE PLASTICS"
Robert L. Simmonds, Celluloid Corporation

"LAMINATED PLASTICS AND THEIR USES"
Arthur J. Briggs, General Electric Company

"THE MACHINERY AND EQUIPMENT OF THE PLASTICS INDUSTRY"—*Illustrated*
Louis F. Rahm, Princeton University
Research Engineer, Burroughs Engineering Company

"MOLDING METHODS AND MARKETS"
Benn C. Budd, American Insulator Corp.

"THE PYROXYLIN PLASTICS IN INDUSTRY"
John E. Walker, Pyroxylin Plastics Manufacturers' Association

"THE PAST, PRESENT AND FUTURE OF PLASTICS"
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PLASTICS, Vol. VII, No. 5, May, 1931. Publication office 49 E. Washington Avenue, Washington, N. J. Executive office, 114 E. 32nd Street, New York City, N. Y. by the Plastics Publications, Inc., R. C. Gilmore, Jr., President. Subscription price, Domestic $2.00 per year, 25c per copy. Foreign and Canada, $3.00 per year. Entered as second-class mail at the Post Office at Washington, N. J., under the act of March, 1879.

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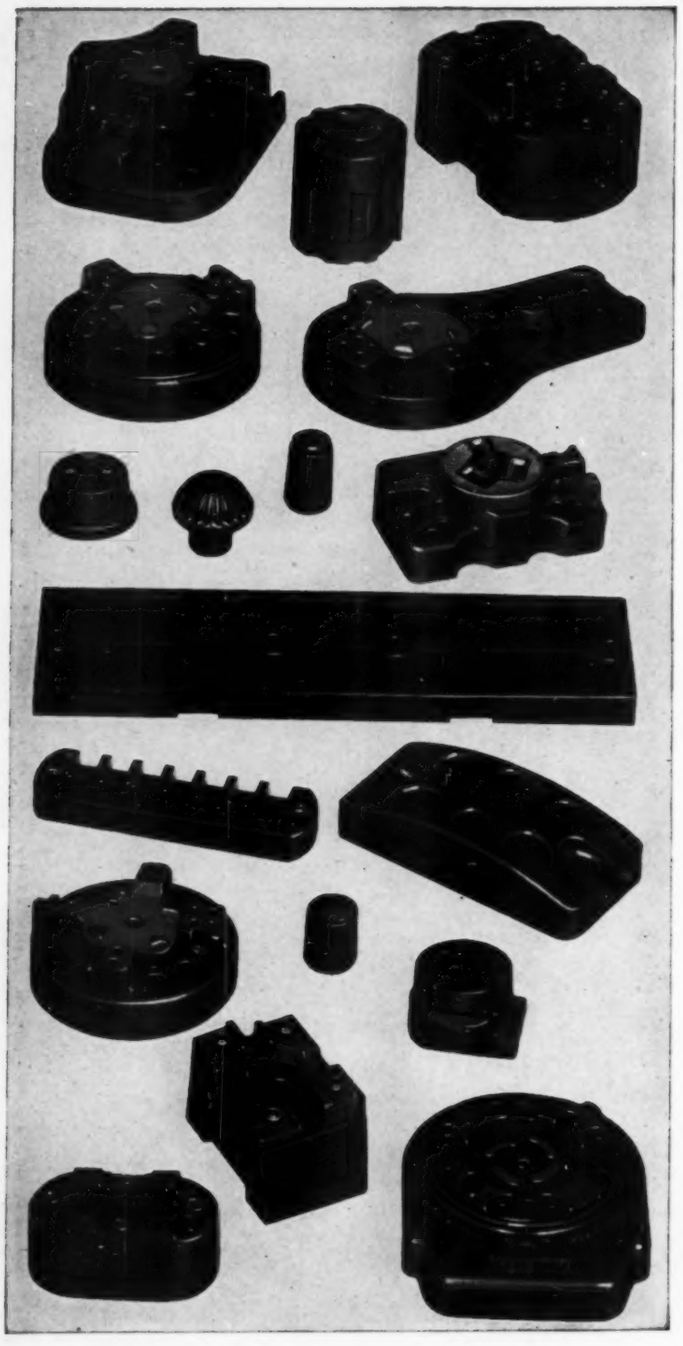

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PLASTICS & MOLDED PRODUCTS

Reg. U. S. Pat. Off.

Volume 7 **MAY 1931** **Number 5**

Contents

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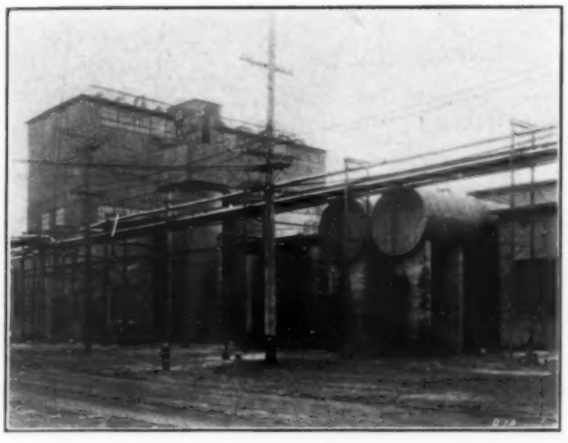
Volume 7 MAY, 1931 Number 5



Outside view of Phenol Plant Dow Chemical Co., Midland, Mich.

PHENOL

The process for making this basic material brings synthetic resinoids within the means of all industry

By Mark E. Putnam,
Dow Chemical Company

THE phenol plant of The Dow Chemical Company is interesting for two reasons. First, because the process is entirely an original one; and secondly, it is the largest operating synthetic phenol plant in the world, having a capacity in excess of 60,000 pounds of phenol per day. It is unique in being the only commercially successful plant to manufacture phenol by the hydrolysis of chlorobenzol. Aside from the above, it is worthy of note for the reason that the by-products furnish a commercial source of three relatively rare products, viz.—diphenyl oxide, ortho-phenyl phenol and para-phenyl phenol.

Chemistry

The chemistry of the process[1] is based on the simple reaction:

$$C_6H_5Cl + 2\ NaOH \rightarrow C_6H_5ONa + NaCl + H_2O$$

Another reaction taking place simultaneously with the foregoing is—

$$C_6H_5ONa + C_6H_5Cl \rightarrow (C_6H_5)_2O \text{ (diphenyl oxide)} + NaCl$$ [2]

If this product is removed from the reaction system, more continues to form; if, however, it is returned to the system, the following reaction takes place:

$$(C_6H_5)_2\ O + H_2O \rightarrow 2\ C_6H_5OH + H_2O$$

Another significant reaction is the formation of diphenyl derivatives—

$$C_6H_5Cl + C_6H_5Cl + NaOH \rightarrow C_6H_5C_6H_4Cl + NaCl + H_2O$$

$$C_6H_5C_6H_4Cl + 2NaOH \rightarrow C_6H_5C_6H_4ONa \text{ (para and ortho)} + NaCl$$

After the hydrolysis has taken place, the sodium phenate solution is neutralized with by-product hydrochloric acid from the chlorobenzol plant. The remainder of the process consists of separating the phenol layer from the aqueous layer.

The plant for carrying out the foregoing reactions consists first of storage tanks for 48° Be′ caustic and chlorobenzene. These materials are handled by pumps through proportioning tanks to emulsification tanks. The tanks supply hydraulic pumps which pump the emulsified phenol and caustic through the hydrolyzing units at a pressure between 4,000 and 5,000 pounds per square inch.

Separation of Phenol

The acidification of the phenate liquors is carried out in tanks at the chlorobenzol plant, which is located only a short distance from the phenol plant, for the reason that phenate liquors are much easier to pump than hydrochloric acid. After acidification, the reaction mixture is returned to the phenol plant where the phenol layer is separated from the aqueous salt layer. The aqueous salt layer is run through a stripping column which removes all but the

[1]. For complete discussion of reactions involved, see article by Hale & Britton, J. Ind. & Eng. Chem., Vol. 20, p. 114.

[2]. U. S. Patent 1,607,618 by Hale & Britton.

merest traces of phenol. This is very important not only from the yield standpoint but even more so from the standpoint of sewage contamination.

The phenol layer is stored in large tanks which permit a more complete separation of the phenol from the water layer. From here it is pumped into stills where the final rectification takes place. Phenol as it comes from the fractionating column enters a series of receivers, where it is sampled for analysis and subsequently pumped into tank cars, packaged, or run into storage.

By-Products

The by-products of this plant (diphenyl oxide and ortho- and para-phenyl phenols) have found important commercial uses.

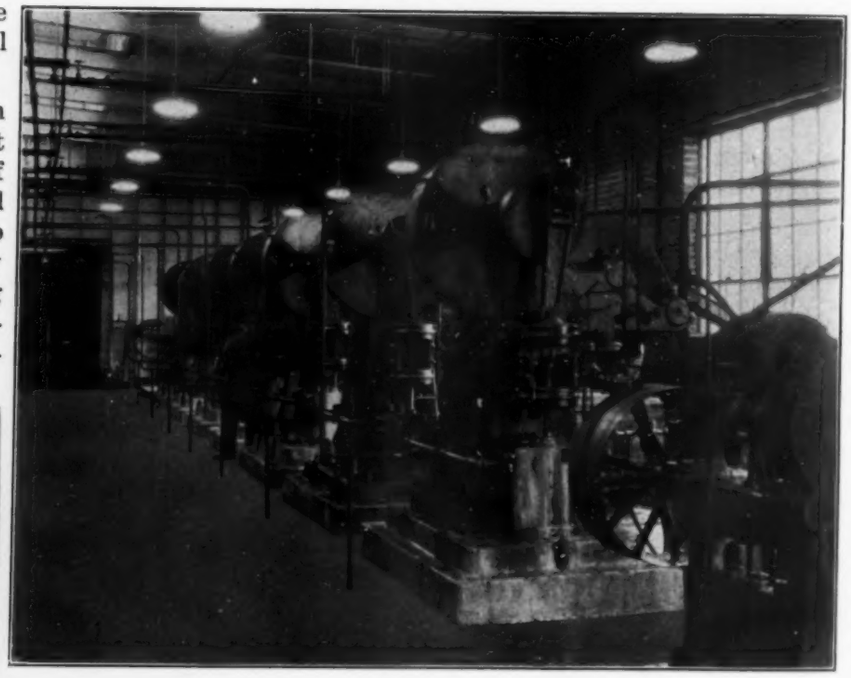
The diphenyl oxide, which may or may not be a by-product depending upon the method of operation, is used in artificial oil of geranium odors. It is also because of its great stability and relatively high boiling point being used for heat transfer purposes and promises important developments along this line.

The ortho-phenyl phenol and its sodium salt, which are very superior germicides and fungicides, are used for many purposes. These by-products are unusual in that they all have important commercial applications.

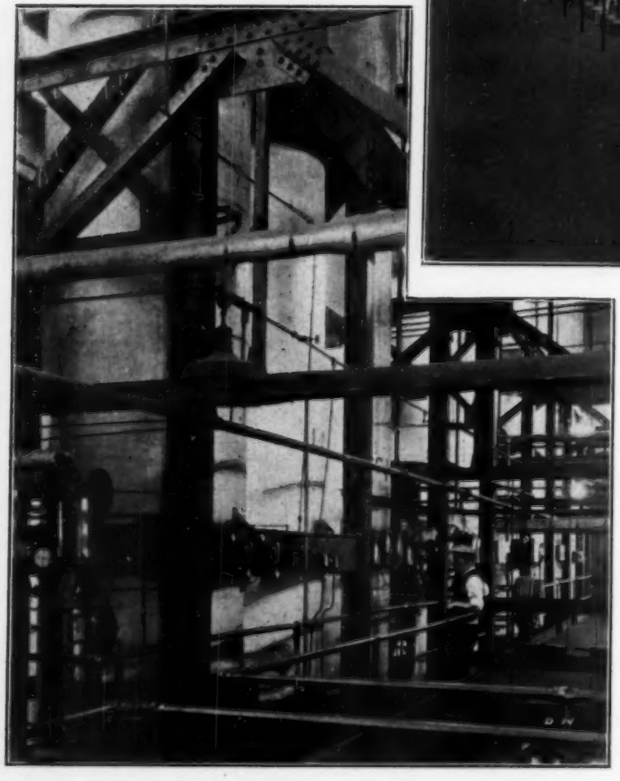
Mass Operation

The above type of plant and process are especially adapted to large scale operation for the reason that most of the steps are continuous and that all materials are handled by pumps. These conditions permit the employment of a minimum amount of labor.

The plant under discussion began operating in May, 1923. Since that time, it has been gradually increased from a capacity of 8,000 pounds per day to its present size. It was some time after starting, due to both chemical and mechanical troubles, before the plant and process were able to demonstrate their superiority. However, as time passed, the troubles were eliminated, until now we are confident that the hydrolysis of chlorobenzol, as a process for synthesizing phenol, possesses sufficient advantages that it is not likely to be superseded by other methods of manufacture in the near future.



These pumps circulate the emulsified phenol and caustic through the hydrolyzing units at a pressure between 4000 and 5000 pounds per square inch.



Phenol is finally purified and distilled in these fractionating columns. Operation of the whole battery is controlled by one man on the platform.

"Dry Ice" in a Molding Powder!

Solid Carbon Dioxide Snow Employed both to Check Reactions in Resin Formation as Well as to Produce Hollow Molded Products

Hot platens on one side, subzero temperatures in the mold; mechanical pressure vs. internal gas pressure, and other paradoxical conditions, form the theme of a highly novel molding method contributed to this rapidly expanding art of forming objects in daily use.

MOLDING is so universally associated with heating that it will astonish most readers to be informed that so efficient a refrigerating medium as "dry ice", which is simply solidified carbon dioxide (carbonic acid gas) (carbon dioxide "snow"—CO_2 "snow" etc.) can find useful applications in the molding of resinoids.

There are numerous resinfying reactions that are so rapid that they will complete themselves to the insoluble infusible stage at room temperatures. It is the purpose of the inventor to prevent premature formation of these products by the low temperatures attainable with carbon dioxide in its solid or "snow" state.

Control of Reactions

Quoting from the patent issued last September (although filed originally in Aug. 26, 1926) we find that Emil E. Novotny, who has done so much in this art, is the inventor of the process. He says in U. S. P. 1,776,-366; Sept. 23, 1930:

The success of the present synthetic resin industry and of the products and methods is due in a large measure to the controlling of reactions whereby resinous products are formed which are relatively slow in reaction and having practically no commercial speed of reactivity at ordinary room temperature. In the present commercial practice the final infusible products are usually formed or molded at temperatures well above 320° F. Even at this elevated temperature, however, the reaction is too slow to compete in speed with the per diem production obtained from a mold or from an operator when compared with the output possible where ordinary thermoplastic products are molded such as, for example, shellac and not to mention cold molding processes.

There are many synthetic resinous products that will react to infusibility at room temperature. In some cases the reaction goes to completion at these temperatures and then, again, in other cases an exothermic reaction sets in at say room temperature, whereby the mass is elevated in temperature due to such reaction, and the products, therefore, form infusible or insoluble resinous products without requiring further heating.

There are other resinous bodies usually made with a deficiency of aldehyde or hardening agent having good keeping qualities at ordinary room temperature which may be shipped and kept in stock for a long period of time without undergoing material changes in composition or structure which may subsequently be speeded in their reactivity by the addition of suitable catalytic agents or by supplying the deficiency of hardening agent or the aldehyde body and which thereby become unstable at ordinary room temperature because of their high rates of reactivity. These products, of course, can be shipped to distant points, kept in stock; and fillers, etc, may be incorporated therewith. Subsequently the reaction may be accelerated to the point where the products must be cooled to temperatures low enough to materially stabilize the reaction until such time as the products are finally formed and used. Under some conditions, where the resins are made in one establishment and shipped to the ultimate user, this procedure is a highly satisfactory one.

Stopping the Reaction

On the other hand it is possible to start off with the original reagents first introducing one reagent into the filler body and subsequently adding the other reacting products while cooling such mixture to the point where the reaction is controllable and decreasing the temperature of the compound until the reaction is practically stopped and cooling for such a length of time as necessary to keep the products ready for use, whereupon the removal of the cooling medium or the application of heat will cause the reaction to ensue. In some cases it is preferable to combine the resin forming reagents, cool the mixture sufficiently to either hold the reaction at the desired reaction stage, the catalyst being added after the reagents have been cooled sufficiently, or the cooling is maintained to such an extent that the reaction takes place in the fillers, and may be held in check by

continued cooling until it is desired to have the reaction proceed to its final infusible form. By thus combining the reagents a solution is usually formed and no other solvents are required. Where the products require an additional solvent it may be added if a solution is wanted.

The products can be used in various ways as by being applied as a surface coating or lacquer, by being impregnated into various absorbent materials such as paper or textile fabrics, by being mixed with various comminuted fillers, etc.

Refrigeration has now progressed to the point where it is possible to maintain uniform temperatures well below the reacting temperatures of the most energetic of these synthetic resin reactions. For that matter, ordinary ice refrigeration may be utilized so long as the materials or products are kept in suitable containers or condition whereby moisture will not readily be absorbed by them. On the other hand, commercial developments have been made in mechanical refrigeration units so that dry refrigeration is a simple matter indeed and offers no difficulties so far as the controlling of the reaction is concerned even though such control must be maintained for days or weeks. Furthermore, it is now possible to obtain dry refrigeration in a very economical manner as by the use of various solidified gaseous products known as dry ice or carbon dioxide (CO_2). This product is very convenient for use as it offers several distinct advantages over other forms of refrigeration.

Mixing In the "Ice"

Where a dry ice or suitable dry refrigeration medium is used it may, of course, be applied to the outside of containers or may be incorporated directly with the product, and when properly distributed will maintain a uniform temperature throughout the mass, obviating any possibilities of local reactions taking place which would tend to raise the temperature of the resinous mass despite cooling means applied to the outside of a container. This is of extreme importance where a considerable quantity of product may be shipped at one time and where the product itself is a poor conductor of heat, in that a large mass of material may develop a reaction which would raise the temperature beyond control faster than the heat could be removed from the reacting mass.

The use of carbon dioxide ice offers advantages in other ways in that the carbon dioxide gas may be caused to be liberated within the center of a mold or die, thus forming hollow molded pieces where a die of close fitting dimensions is used. This may readily be done by introducing a preformed piece of carbon dioxide ice into the center of a preformed piece of synthetic resin product or other suitable molding material. Upon heating, a large quantity of the gas will be liberated and this will force the molding product to the outside walls of the die, forming a hollow molded object. This method can be well utilized for such purposes as the manufacture of hollow gear shift balls or may take the place of various odd shaped core pieces.

Absorbing the Gas

The CO_2 ice may likewise be used in such small quantities and may be so thoroughly intermixed with the molding product that there will be no objection to the gas being formed in situ, and with the ordinary type of mold the gas will be readily liberated from the mold cavity and the piece. However, where it is to be combined this may readily take place by the addition of suitable combining ingredients such as, for example, calcium oxide or hydroxide, which will combine with the carbon dioxide and form calcium carbonate, an inert filler. Therefore, as the temperature of the product is increased the CO_2 gas is liberated and this gas is caused to react with the combining agent.

In the following examples only a few resins are illustrated as it is to be understood that the examples given, so far as the resin compounds are concerned, are more by way of illustration than detailed exact steps to be followed. It is to be understood that most of the aldehydes when in the presence of suitable combining bodies and catalysts can be made to react very energetically. Now if these resinous products are thoroughly and uniformly cooled in order to control the reaction, useful resinous products of a potentially reactive, fusible and, if desired, soluble form result. By further cooling of the product the reaction will be interrupted and by maintaining the cooling the said reaction products will remain in substantially their potentially reactive form while said cooling is maintained. By removing the cooling medium and or on subsequent heating the reaction is resumed until the final infusible products are formed. This final reaction may take place at room temperature or very rapidly at elevated temperatures.

Example No. 1

Resorcin	1.80
Paraformaldehyde	.915
Wood flour	2.71
Dry ice	.50

All parts by weight. The product is thoroughly mixed in any suitable manner and if the dry ice were not present the product would go to infusibility before a molding operation could be resorted to. With the dry ice in situ, however, the reaction is very readily controlled and a thorough coating and mixing is to be had. The ingredients may be molded in various ways as, for example, they may be fed into the hopper of an ordinary preforming press, whereby various molded shapes can quickly be made. By allowing

(*Continued on page 290*)

Molding *Makes* a Product

The new model Visualette Demonstrator, with its resinoid case and parts, is efficient and attractive

By C. H. Whitlock

Norton Laboratories, Inc.

RECENTLY the Visual Demonstration Systems, Inc., of Buffalo, New York, made an addition to its line of film projection machines. The new model is known as the Visualette Demonstrator and is constructed entirely of molded plastics with the exception of the various optical and mechanical units. It has met with instant success.

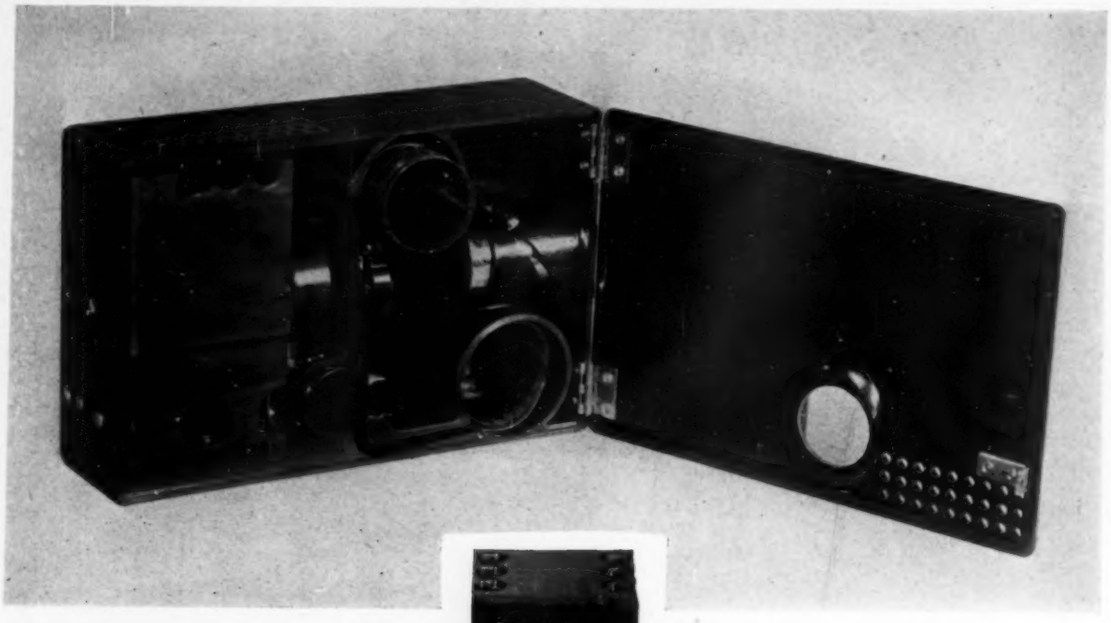
The Visualette Demonstrator is used in sales and instructive work and projects a still picture on a wall or screen from a distance of three to fifty feet. The projector uses standard 35 mm. safety motion picture film on which as many as one hundred different pictures may be developed. The attractive appearance, light weight and extreme compactness of the Visualette, so characteristic of resinoid molded applications, solved problems that have confronted the manufacturer of this device for years.

In the development of the new model, it was necessary to maintain the maximum efficiency of the lamp and yet design a projector that could be carried as conveniently as a pocket camera. Slight changes in the lense sizes to meet the new requirements eliminated loss of light and added clarity to the picture when projected.

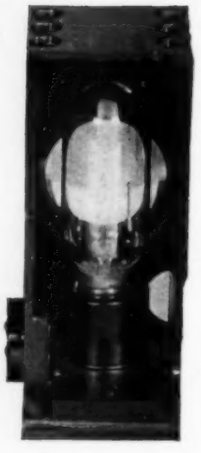
Design and Efficiency

In designing, it was necessary to seriously consider shrinkage and distortion of the molded parts which support the reflector and lenses so as to reduce distortion of the projected picture to a minimum. Consequently, by working to very close tolerances, usually practised in the production of the most delicate machined parts, the light rays were kept within a very limited space with practically no loss of light. This was not only done but the efficiency of the projector was actually increased.

The lamp, a 50 watt condensed filament type, replaces a 250 watt lamp used in the older metal demonstrators, and is encased in a housing of molded heat-resisting material of the highest quality, properly ventilated to carry off as much heat as possible. The lamp is set in a molded socket also made of heat-resisting material, so designed that it can be easily removed from the lamp housing. The current supply is taken from a receptacle incorporated in the lamp housing and spring contacts carry it to the lamp socket. This design of the lamp housing makes it an individual unit entirely independent of the case into which it slides. The unit may thus be tested from any source of current before the projector is assembled.



The demonstrator case showing molded details compactly housed. Vent holes permit heat from lamp to dissipate but light loss is kept to a minimum.



The lamp housing is a self-contained unit of heat-resisting material. A 50 watt lamp replaces the 250 watt lamp used in the old projector.

The usual design for handling the film in projectors of this type calls for a magazine into which a roll of film is inserted, the end of the film being brought down over the aperture and onto the sprocket. In the course of operation, the film is unrolled from the magazine and pushed out through an opening in the case or re-rolled, while in operation, in a much larger magazine attached to the outside of the case. In very few instances could the film be backed up to its starting point after it had once been projected. The Visualette Demonstrator is an improvement in this respect, having two magazines entirely within the case, with a patented feature which enables the passing of the film from one magazine to the other and back by simply turning the operating knob in the required direction. It is possible to handle a film with approximately one hundred frames in this manner.

Heretofore, metal has been the material customarily used in the construction of this type of Demonstrator and where the film comes in contact with the metal it is necessary to form ribs in such a manner that the film rides only on its edges. This precaution must be taken to prevent scratching of the emulsion side of the film. Through experimentation, it was found that the resinoid molded part did not scratch the sensitized surface of the film, thus making it far more satisfactory for this purpose than the metal.

Film Magazines Inside

The two film magazines and the support for the front lense are incorporated in the body of the case. On the top side of this support is a spiral slot which enables the operator to easily adjust the lense for correct focus. The mold for the case is constructed with four side bars which permits the formation of all ventilation openings, rivet holes and the arrangement for supporting the front lense. The only machining required on the case, with the exception of the customary removal of flash, is the drilling of one hole. This arrangement is responsible for many economies which are typical of plastic molding production.

The projector embodies fifty seven separate details which include seventy five individual parts all of which are assembled and tested by the molder, making a complete projector ready for operation. Norton Laboratories, Inc., of Lockport, N. Y., are responsible for this interesting example of synthetic plastic molding. Their engineers developed the projector from the basic ideas of the officials of the Visual Demonstration Systems.

Casein Solids Supreme in the Button Field

Lustrous, luminous, warm to the touch, and easy to work with.

ABOUT the time that the European casein solids industry first got into its stride coincides more or less with the rise of the casein solids button industry. Only a short time after the introduction of the casein solids, practically every factory in Europe that was manufacturing buttons and the like began to adopt casein solids as their main raw material. It can now safely be stated as a fact that every button factory is now also a casein solids button factory.

The underlying reason for this change in raw materials, and the adoption of a material that was entirely new, were the ease with which the casein solids could be fabricated into buttons and the particular beauty of the material when finished. Casein solids have a lustre peculiar to themselves, which is not approached by any other plastic material. The colored articles have a marked luminiscence, and the product lends itself as no other raw material for the production of startling mottled and striated effects; all of which adds to its popularity. For women's wear, the casein button reigns supreme in its field.

Other Materials

It must be admitted that there are other button materials, and that buttons made of glass, molded products, artificial resins and the like are very pretty, but they differ in their type of lustre and do not fit as harmoniously as does the casein solids button into the general make-up of women's wear. The lustre or gloss of the other button materials, such as the synthetic resins, is too hard or vitreous; and in general they are too transparent, which gives them an empty appearance; or, if they are filled with opaque pigments, they are too "stony"; properties which do not recommend them when worn on clothing. Another objection to button materials other than those of casein is that they feel cold to the touch, which to many users is quite objectionable.

New Methods

The most satisfactory button is that made of horn, but it is expensive, and can, of course, only be turned out in limited sizes and in but a few colors. The casein button, therefore, is the best artificial material for all around purposes. It has no difficulty in competing with ivory-nut buttons, for the latter, although very excellent, are strictly limited in size, and can only be produced in opaque colors; hence they are limited to men's wear almost exclusively. As the machinery used for the manufacture of ivory-nut buttons can also be used with practically no changes for the manufacture of casein-solids buttons, it is not surprising that many American manufacturers of buttons are changing over to caseins solids for their raw material, especially where color is desired.

A further impetus is being given to the use of casein for the manufacture of buttons, for methods have now been developed that do not require the manufacture of casein colids, which are later turned into buttons, but which produce the buttons right from the casein itself. The process in question yields button "blanks" that lend themselves without further treatment to the finished and drilling operations on the same automatic machines that are now in use in American ivory-nut and mother-of-pearl button factories. As the casein blanks are somewhat softer, the production speed of the automatic machines can be increased.

Another factor which is increasing the manufacture of casein buttons in America is the tariff situation, which increases the price of the imported casein buttons in the United States, and gives the local manufacturers here a better opportunity to compete. The tariff has little effect on ivory-nut or pearl button manufacturers, as these had practically no competition from abroad, especially as far as first-class goods were concerned.

A Good Opportunity

The writer does not wish to be misunderstood as declaring that casein buttons can only be successfully made by plants already equipped to make ivory-nut or pearl buttons; and also that he is aware that there is a large production of buttons other than casein for women's wear; but what he does wish to emphasize is the fact that the manufacture of casein buttons at the present time appears to present very good opportunities for business.

In passing it might be mentioned that one of the largest American manufacturers of casein buttons does not make any ivory-nut nor pearl buttons at all; but in addition to his line of women's wear buttons also turns out casein solids buttons for men's wear.

Cellulose Plastic Containers

Replacing glass and metal, Hycoloid is another synthetic factor in the modern packaging field

By Herman B. Lermer
Hygienic Tube and Container Co.

THE demand, for a light weight container to supplement glass in certain fields, has persisted for many years. Selling by the eye is still the most successful method used in merchandising.

To meet this demand, seamless cellulose containers have been developed. This type of container is being used not only in place of glass but also to replace metal containers and collapsible tubes. It must be made clear at the outset, that cellulose containers cannot be used in all instances where glass or metal are used at present. Limitations exist with each type of material and each has its own field.

Development of cellulose containers was started in 1915 by the predecessor of the Hygienic Tube & Container Co. World conditions at that time were favorable toward advancing the art of manufacturing such an article. This was especially true after the United States entered the War. Metals were at a premium and they were also needed in the production of war supplies.

Research and Materials

The manufacture of seamless tubes and containers required considerable research and patience. As is true in all developments, this work must go on continuously.

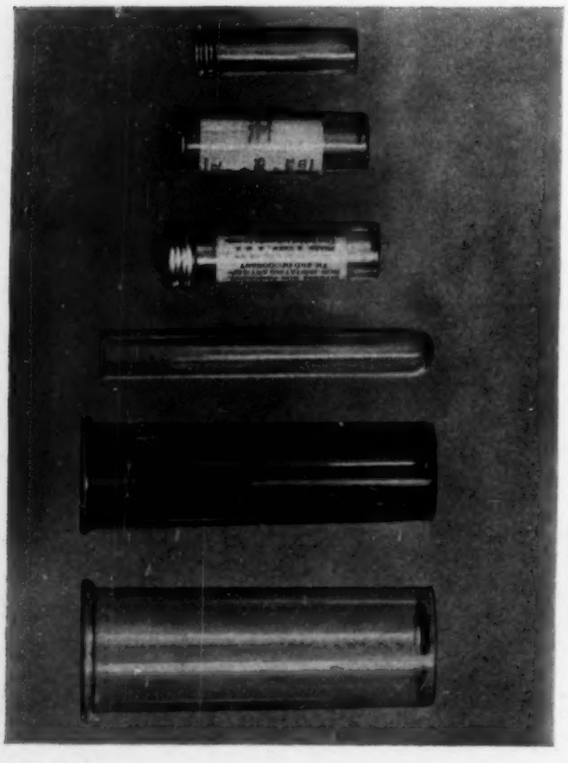
Hycoloid containers are manufactured from either cellulose nitrate or cellulose acetate as a base. The use of one or the other depends entirely upon the field to be served. The important factor in manufacture was to have the material remain flexible on ageing and also to have it odorless and tasteless. Hycoloid containers are made transparent or opaque. In addition, the containers are also colored in any shade or tint. Vials, bottles, jars, collapsible tubes and non-soluble capsules are some of the standard forms in which Hycoloid containers are made. Special containers are manufactured according to specifications.

Labeling

The containers are decorated by a special process. Color effects can be obtained to carry out color schemes involving four colors. The decorating is permanent and will not flake or crack off even when the container is pressed together.

It is difficult to enumerate or classify all the uses to which Hycoloid containers are put. It seems that each user has his own special requirements. A common use of Hycoloid collapsible tubes is in packing mercurial ointments. It is known that mercury cannot be kept in metal containers due to the chemical change that takes place. To meet the demand for a convenient package to handle this ointment, the Hycoloid collapsible tube, was developed.

Calomel ointments, contain-



Hycoloid plastic containers are made transparent or opaque in a wide variety of shapes as packages for many products.

ing as high as 33% calomel, have stood the test of time in these tubes regardless of climatic conditions. The filled tubes were kept under very cold conditions and also sent to Latin American countries for heat tests. There was no effect on the contents and the Hycoloid tubes did not become brittle in the cold or soft in the heat.

Packaging Medicinals

There is no question but that the manufacturers take all possible precaution in packaging products but there are certain conditions beyond their control. Particular reference is made to metal collapsible tubes which are used for preparations applied to very delicate membranes, especially the eye. The process for manufacturing metal tubes makes it impossible to eliminate all the metallic dust and fine particles of metal which may accumulate from one operation or another. It must be made clear that not all metal tubes are thus contaminated but the possibility exists and has shown itself many times. The process for manufacturing Hycoloid collapsible tubes eliminates this hazard. The processes in each case are vastly different.

Tubes and Tariffs

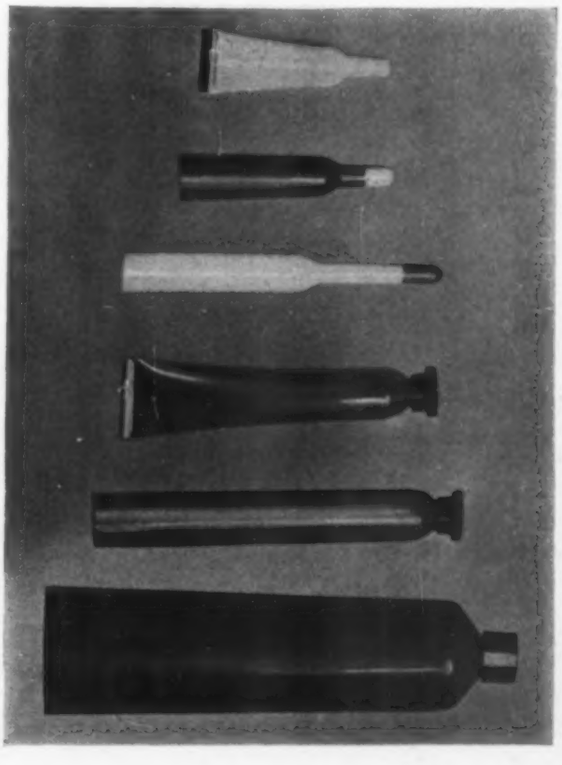
The tariff in some Latin American countries presents a peculiar problem to manufacturers of products in small containers who do an export business. The tariff is based on the weight of the article. Included in the weight is the container; therefore, if the item in question weighs 1 ounce and the container 3 ounces, duty is charged on a basis of 4 ounces. This method of calculation does not seem fair but nevertheless is applied. Glass bottles are most commonly used in export. In comparison with Hycoloid containers, glass is about 80% heavier. It can readily be seen that a tremendous saving is effected by manufacturers using Hycoloid.

In hospitals and laboratories, infectious specimens of all kinds are handled. These specimens are contained in glass. After they have served their purpose, the problem is to find some way to dispose of the container and its contents without exposing anyone to the hazard of infection.

The glass container cannot be thrown into the garbage nor into an incinerator. Therefore, the contents had to be removed and burned and the container washed and sterilized before it could be thrown away. This is entirely overcome by the use of Hycoloid containers. The remaining specimen and container is thrown into the incinerator and burned, eliminating a most disagreeable operation under the best conditions.

Collapsible tubes for creams, pastes and unguents are being made in a variety of forms depending on the use for which they are intended. A nationally-advertised facial cream utilizes not only a Hycoloid container but makes it a more fully all-plastic package by topping the tube with a resinoid molded closure. The Hycoloid tube is threaded to receive molded as well as metal closures. The eye preparation previously mentioned is packed in a small tube, the end of which is drawn to a point to facilitate use.

Hycoloid is not expected to entirely replace glass or metal containers but successful applications are being found in various fields.



Transparent Hycoloid plastic collapsible tubes, some fitted with plastic molded closures, so that he who uses his toothpaste may also see it.

Marvin Appointed Hercules Advertising Manager

THEODORE MARVIN was appointed advertising manager of Hercules Powder Company, it was announced by President Russell H. Dunham.

Marvin, who has been assistant advertising manager and editor of The Explosives Engineer magazine, assumes the post vacated April 5 by the death of Nelson S. Greensfelder.

The new advertising manager has been an employe of Hercules Powder Company for eight years. A graduate of the Colorado School of Mines, he became in 1923 associate editor of The Explosives Engineer, published by Hercules Powder Company, and in 1925 became its editor. In 1929, he was appointed assistant advertising manager.

The Nitration of Cellulose With Nitric Oxides

Modern Improvements Lead to Better Control of Solubility, Viscosity and Stability.

DESPITE the inroads that the advent of other plastics have made on the pyroxylin products, they continue to be made on a continually increasing scale. The demand is caused partly by the tremendously increased use of pyroxylin lacquers, and by the manufacture of shatterproof glass.

While the nitration of cellulose has become practically standardized, new methods which either increase the safety or simplicity of the production, or lead to better control of solubility and viscosity, are of interest.

The following, process though patented, has been donated by the inventor to the public and hence may be practiced by anyone without the payment of royalties. It is the invention of Louis A. Pinck, of Washington, D. C., U. S. P. 1,784,945; Dec. 16, 1930.

Nitric Acid Replaced By Nitrogen Oxides

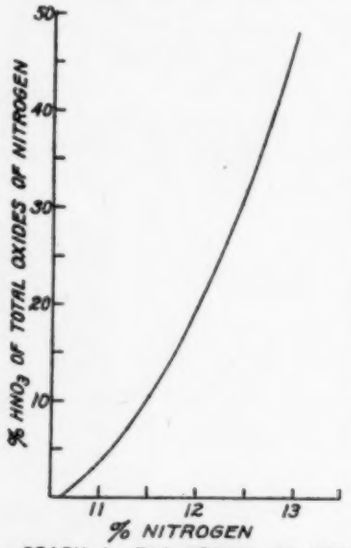
It is the object of this invention to provide a method of nitrating cellulose by the use of a nitrating mixture in which the commonly employed nitric acid is partially or completely replaced by oxides of nitrogen. Worden in his work entitled "Nitrocellulose industry", vol. 1, p. 33, says that nitrogen peroxide in the liquid form has a very destructive action upon cellulose. However, in the present process, cellulose is nitrated rapidly with oxides of nitrogen without oxidation and with good yields or nitro compounds, when sulphuric acid is present.

Ordinarily, cellulose is nitrated by treating it with a mixture of nitric acid, sulphuric acid and water. The sulphuric acid in the nitrating mixture of the present invention, serves a purpose quite distinct from that in the case of the well known mixed acid nitration. It not only functions as a dehydrating reagent, but it enters into the reaction chemically, as shown in the following equation:

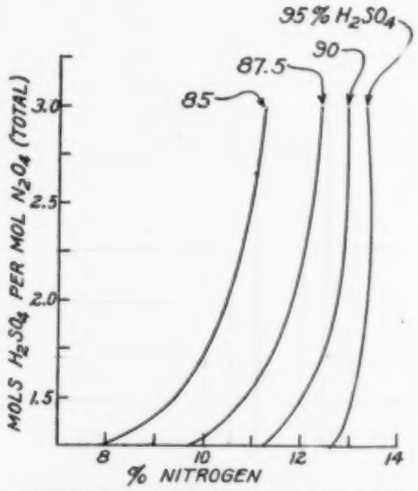
$$H_2SO_4+N_2O_4=SO_2\begin{matrix}ONO\\OH\end{matrix}+HNO_3$$

Nitric acid is formed in situ, and reacts with the cellulose and the sulphuric acid inhibits the destructive action on the cellulose by the oxides of nitrogen.

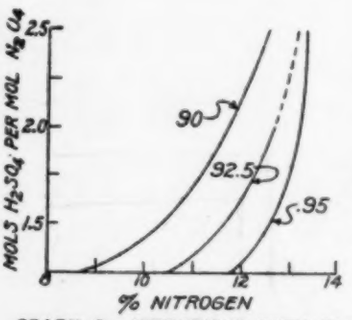
By "oxides of nitrogen" is meant such fluids as are obtained, for example, by the arc process of nitrogen fixation, oxidation of ammonia or other processes, and consisting principally of NO_2 and N_2O_4. While NO_2 and N_2O_4 substantially free from other oxides of nitrogen are the preferred reagents in the present process, it will be understood that NO_2 and N_2O_4 containing other oxides in quantities such as are liable to occur



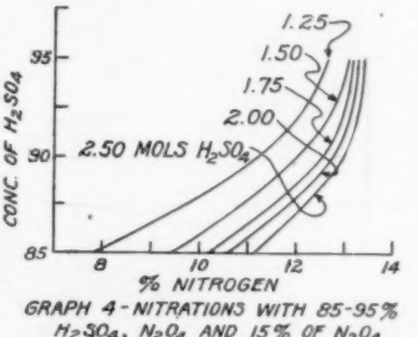
GRAPH 1 - THE EFFECT OF HNO_3 ON CELLULOSE NITRATIONS



GRAPH 3 - NITRATIONS WITH 85-95% H_2SO_4, N_2O_4 AND 15% OF N_2O_4 AS HNO_3



GRAPH 2 - NITRATIONS WITH 90-95% H_2SO_4 AND N_2O_4



GRAPH 4 - NITRATIONS WITH 85-95% H_2SO_4, N_2O_4 AND 15% OF N_2O_4 AS HNO_3

as impurities in the preparation of this reagent, may be used.

It is well known that at certain temperatures nitrogen peroxide (NO_2) polymerizes to form nitrogen tetroxide (N_2O_4). The amount of nitrogen tetroxide in equilibrium with nitrogen peroxide depends upon the temperature and pressure. For the purpose of this disclosure and claims the term "nitrogen tetroxide" will designate all states of aggregation of the chemical species nitrogen peroxide and nitrogen tetroxide.

Futhermore, the oxides of nitrogen may contain some nitric acid resulting from an interaction of the oxides with the moisture that is usually present. The quantity of moisture may be varied at will and the amount of nitric acid formed will vary accordingly.

Results Obtained

The results obtained in the process of this invention are illustrated graphically, in the accompanying drawing.

Graph 1 shows the effect of varying the amount of free nitric acid in the nitrating mixture.

Graph 2 shows the effect of nitrating cellulose with a mixture of nitrogen oxides practically free from nitric acid, and sulphuric acid of concentrations ranging between 90 per cent and 95 per cent.

Graphs 3 and 4 show the effect of nitrating cellulose with a mixture of nitrogen oxides containing 15 per cent of the N_2O_4 as nitric acid, and sulphuric acid of concentrations ranging between 85 per cent and 95 per cent.

When nitric acid, aside from that formed by the interaction of oxides of nitrogen with sulphuric acid, is used in the nitrating mixture, the degree of nitration is markedly increased. It is readily seen in Graph 1 that the greater the amount of nitric acid used corresponds to a greater degree of nitration; however, the specific effect of each increase in concentration of free nitric acid decreases with increasing concentrations.

A knowledge of the wide application of the method disclosed, may be gained by studying Graphs 2, 3 and 4. These curves show that there is a definite relationship between the degree of nitration and the concentration of the sulphuric acid as well as the molecular ratio of the sulphuric acid with respect to the N_2O_4. It was found that (1) when oxides of nitrogen practically free from nitric acid are used, the concentration of the sulphuric acid may range between 95 and 90 per cent, and (2) when free nitric acid is present in the nitrating mixture. lower concentrations of sulphuric acid may be used. For example, if 15% of the N_2O_4 is replaced by nitric acid, the concentration of the sulphuric acid may range between 95 and 85 per cent. The presence of free nitric acid not only increases the degree of the nitration but it also permits the use of sulphuric acid of lower concentrations which otherwise would have a deleterious action on the cellulose or its nitric esters. It is to be noted that in nitrations with 1.75 mols. or more of 95 per cent sulphuric acid, the effect of free nitric acid is not significant.

Effects of Variations

It was also found that the molecular ratio of sulphuric acid to nitrogen tetroxide should be in the range of 1.25 to 3.0. Decomposition may take place beyond these limits, especially with the lower concentrations of sulphuric acid. By means of Graphs 3 and 4, the degree of nitration of any concentration of sulphuric acid ranging between 85 and 95 per cent and for any molecular ratio of sulphuric acid ranging between 1.25 and 3.0 mols per mol. of total N_2O_4 may be computed.

A study of the graphs will show that the same or higher degrees of nitration may be obtained by using a larger quantity of sulphuric acid of a lower concentration as compared with a smaller quantity of a more concentrated acid. For example, in Graph 2 one will find three different compositions of the nitrating mixture for the preparation of a nitrocellulose having 12 per cent nitrogen, and in Figure 4 one will find five. However, the proportions are not limited to those represented by the points in the curves. For practical purposes any proportion which is represented by a point preferably within the area bounded by the outermost curves, may be used.

Other factors which influence the degree of nitration are (1) the ratio of cellulose to nitrating mixture, (2) time, and (3) temperature. It was found that the best results were obtained by using 1 part of cellulose to 15 parts of oxides of nitrogen, by weight. For any considerable increase of cellulose there is a decrease in the degree of nitration. The time of nitration of course is dependent upon the temperature of the reaction. If nitration is carried out at 30° C., the maximum degree of nitration is effected in approximately four hours, and at 25° C., in approximately five hours. However, the reactions may be terminated, if desired, before they go to completion. At higher temperatures, the reaction will go to completion in considerably less time.

Furthermore, the course of the nitration is greatly affected by the physical form of the cellulose. Filter paper is much slower in attaining its maximum degree of nitration than cotton-wool and the thicker and denser the paper, the more is the nitration delayed.

The following examples are given to illustrate the manner of carrying out the process of this invention in the preparation of a nitrocellulose having 12 per cent nitrogen:

Some Examples

Example 1.—Gaseous or liquid oxides of nitrogen are passed into 95 per cent sulphuric acid until the proportion of oxides of nitrogen calculated as nitrogen tetroxide to sulphuric acid is 1 molecule per 1.29 mole-

cules. Since this reaction is exothermic, provision is made for proper cooling and agitation or else the mixing of the reagents should be carried out with agitation in a closed system to avoid the escape of the oxides of nitrogen before all of it has completely reacted with the sulphuric acid. Then approximately 1 part by weight of cellulose is added to an amount of the above solution corresponding to 15 parts by weight of oxides of nitrogen and the reaction is allowed to proceed for approximately four to five hours at 25 to 30° C. The nitration may be facilitated by agitation, centrifuging or steeping, this being dependent upon the type of nitrator employed. The nitrocellulose formed is then removed from the nitration vessel and treated in the usual way.

Example 2.—Gaseous or liquid oxides of nitrogen, in which 15 per cent of the N_2O_4 is in the form of nitric acid, is passed into 90% sulphuric acid until the proportion of the total oxides of nitrogen calculated as nitrogen tetroxide to sulphuric acid is 1 molecule to 1.50 molecules. As an alternative, free nitric acid may be added to the sulphuric acid or to the solution of the oxides of nitrogen in sulphuric acid, in the proportions designated above. The method of procedure and ratio of cellulose to total oxides of nitrogen are similar to that specified in Example 1.

In a similar manner, such cellulosic substances as hydrocellulose, oxycellulose, etc., may be nitrated.

The process described is advantageous in that there is a direct utilization of the oxides of nitrogen obtained by the ammonia oxidation or the arc processes. This avoids the necessity of going through the expensive steps of producing nitric acid suitable for nitration purposes. The process is economically superior to the existing methods, especially when the cost of synthetic nitric acid is on a competing basis with nitric acid produced from Chile nitrate.

The claims cover:

1. A process of nitrating cellulosic substance, which comprises reactions obtained by passing oxides of nitrogen into sulphuric acid until the molal ration of the latter per mol. of nitrogen tetroxide is from approximately 1.25 to 3.0, and then adding cellulosic substances.

2. A process of nitrating cellulosic substances, which comprises reactions obtained by passing oxides of nitrogen containing nitric acid into sulphuric acid until the molal ration of the latter per mol. of nitrogen tetroxide is from approximately 1.25 to 3.0 and then adding cellulosic substances.

3. A process of nitrating cellulosic substances which comprises reactions obtained by adding oxides of nitrogen and nitric acid to sulphuric acid so that the molal ratio of the latter per mol. of total nitrogen tetroxide is from approximately 1.25 to 3.0 and then adding cellulosic substances.

4. A process of nitrating cellulose, which comprises in passing oxides of nitrogen into sulphuric acid, then adding cellulose and carrying the reaction substantially to completion.

5. A process of nitrating cellulose, which comprises bringing about reactions between cellulose, oxides of nitrogen containing nitric acid, and sulphuric acid at temperatures ranging between 25 and 30° C. for a period of 4 to 5 hours.

A. S. T. M. to Have Exhibit of Testing Apparatus and Machines

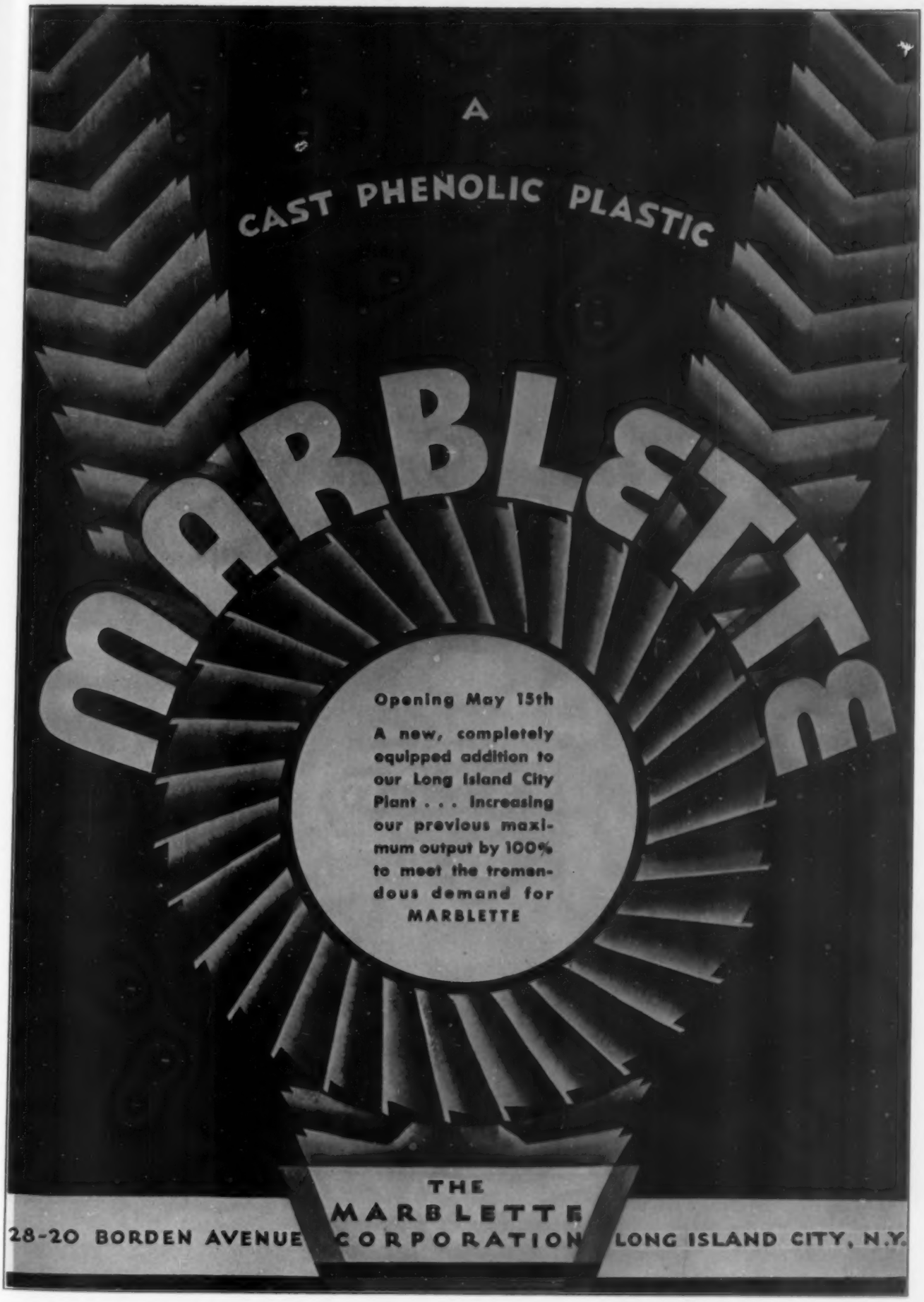
FOR the first time in its history the American Society for Testing Materials will sponsor an Exhibit of Testing Apparatus and Machines in conjunction with the Annual Meeting of the Society, at The Stevens in Chicago, June 22-26. The Exhibit has been planned with a view to having a distinctly scientific and broadly educational atmosphere which will be consistent with the technical nature of the Society's activities.

The Exhibit is limited to equipment and apparatus used in the testing of materials and products, and recording and control equipment which is used in testing will be shown. Testing machines of all types, metallographic and optical equipment, certain chemical and physical testing equipment, and specialties—for example, sieves, pyrometric apparatus, fatigue machines, etc., will be in the displays of the leading companies in these fields. Manufacturers, distributors, and representatives of foreign companies will have equipment on display which covers practically all phases of the testing field.

The Exhibit will afford the Society membership and others an opportunity to acquire firsthand knowledge of available equipment, especially of newer types and developments. Some companies are planning to show for the first time testing equipment which they have developed.

J. F. Walsh Now With Arthur D. Little, Inc.

MR. JAMES F. WALSH formerly Vice President and Technical Director of the Celluloid Corporation, has joined the consulting staff of Arthur D. Little, Inc., consulting and research chemists of Cambridge, Mass. Mr. Walsh has been active in the development of different types of plastics and is well known in the industry. He had been with the Celluloid Corporation since 1920 and while there, developed many processes and products for films plastics, cements and dopes.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NEWS *of the* INDUSTRY

New Corporation to Enter Urea Resin and Powder Field

IT is announced that the Unyte Corporation was formed on February 27th, 1931 and acquired patent rights and processes relating to the production of Urea Resins and their use for molding compositions, lacquers, etc., from Ellis-Foster Company and Carleton Ellis of Montclair, N. J., and I. G. Farbenindustrie A. G. of Frankfurt on Main, Germany. The patents and processes involved are the result of a long period of research on the part of the three parties and plans are said to be in progress for large scale production of molding compositions which will be available to the molding industry.

It is also understood that the Unyte Corp. may consider granting licenses under its patent rights.

Pyralin in Striking Color Effects Used for Fountain Pens

STRIKING color combinations feature the new line of Pyralin fountain pens, according to an article in the current issue of the Du Pont Magazine. These pens are available in pearl, in genuine fish essence pearl effects, as well as in translucent and opaque colors. The pearl effects are in red, black, silver, blue-green, pink and blue, and green and black. Bronze color combinations in black and gold, black and green, red, green and blue are especially attractive, while translucent mottles of red and blue, blue and blue, and brown and onyx are also innovations. Contrasting vein effects are had in single or two-tone colors, with the beauty of the veins accentuated by another color along the edges.

London Times Issues Plastic Trade Supplement

A SPECIAL issue of the Trade and Engineering Supplement of the **London Times** of March 28th was devoted exclusively to the Plastic and Allied Industries. Its contents were most comprehensive and leading authorities on the various subjects contributed articles. In addition to a broad survey of the industry in its international aspects, there were detailed accounts of the developments in phenolic and urea-formaldehyde resins, cellulose acetate, celluloid, laminated materials, fillers, mold design and manufacture, molding machinery, pigments and dyes and hard rubber and rubber substitutes. The contributors included Dr. Herbert Levinstein, Dr. E. E. Wolker, Rex Jones, T. R. Dawson, L. M. T. Bell and Dr. Henry P. Stevens.

It must be gratifying to workers in the field to know that probably the greatest newspaper in the world has taken this interest in the industry.

Kurz-Kasch to Mold Line of Jar and Bottle Caps

THE Kurz-Kasch Company are building up a complete line of Bakelite molded jar and bottle caps. Their already extensive line includes, among others, bottle caps ranging in size from 18 to 30 M/M, special long skirted bottle caps, 20 M/M and 15 M/M, and jar caps in sizes, 33, 45, 51, 58, 60, 70, and 89 M/M. Kurz-Kasch have adopted the constructive policy of surveying the packaging field with a view to meeting every reasonable size-and-design demand for molded closures, and are installing equipment to meet these demands as promptly as they arise.

Hercules Powder Advertising Manager Dies

NELSON S. Greensfelder, advertising manager of Hercules Powder Company and nationally known authority on industrial advertising died Sunday morning, April 5.

The end came suddenly after a short illness which quickly developed into pneumonia. He is survived by his wife, Grace Gleason Greensfelder, and seven-year-old son, Robert J., and by his parents, Judge and Mrs. J. B. Greensfelder, Kirkwood, Missouri.

Resin Development Secured by Patent Agreement

FOR several years the paint, varnish, lacquer, and enamel industries have shown great interest in the phthalate and similar synthetic resins of the polybasic acid type, variously designated as alkyd, glyptal, and rezyls. Development of these resins and their uses has been retarded, however, because of the patent situation. Each of the three groups which have been responsible for the development of these resins and are actively engaged in research in this field—namely, General Electric Co., du Pont Co., and American Cyanamid Co.—has been faced with the possibility that resins and products from resins which they have developed and placed on the market might come under patent control of one of the other groups as a result of some patent obtained upon the application now pending in the U. S. Patent Office. There are a large number of these applications, besides a considerable number of issued patents controlled by the three groups. The patents and pending patent applications cover both the resins and their uses, and are

not limited to the field of coating compositions.

It is now announced that this restraint upon the development of these synthetic resins has been removed by a series of agreements. The parties to these agreements are General Electric Co. and its controlled companies, E. I. du Pont de Nemours & Co. and its controlled companies, American Cyanamid Co. and its controlled companies (including the Rezyl Corp.) and the Ellis-Foster Co., which together with Rezyl Corp., controls the inventions of Carleton Ellis in this field. The purpose of these agreements is to make it possible for each group to pursue its technical and commercial development in this resin field with the assurance of immunity against prosecution of itself or its customers under the patents that are at present owned or may shortly be obtained by the other groups. Greatly increased activity in synthetic resins is expected to result.

Heavier Cellophane May Replace Muslin in Construction Work

THERE is some likelihood that skyscrapers under construction in New York will within a short time be equipped with cellophane windows instead of regular glass or the muslin which has been the usual covering during the building period. Several contractors have asked one or two of the leading manufacturers of cellophane to prepare specifications for this type of window covering and it is understood that a survey is now being made with an idea of developing a material which will meet their needs.

Seadrome Model of Pyralin

THE largest and most interesting model ever constructed of Pyralin is the Armstrong seadrome, now at the Du Pont Exhibit, Atlantic City. The model is 11 feet in length and 42 inches at the widest part. It is amber colored.

Methods of Testing Molding Compounds

By A. J. Norton

General Plastics, Inc.

PROBABLY no phase of any industry is more important, both to the consumer and the producer, than the testing of the finished material. This is particularly true of molding compounds, due to the variety of conditions under which the finished product is going to be molded.

The method now used by General Plastics is a result of many years experimentation and is based fundamentally on a principle as nearly approaching actual molding conditions as is possible to obtain in a laboratory.

There are four features of a molding compound which are of vital importance to the user. The first of these, of course, is the preforming. If a material will not preform, it cannot be tried in the mold, and every batch of Durez is tested on a preforming machine to determine the ability of the compound to form satisfactory pills under the different conditions required of it in the field.

Plasticity Test

The second test is the plasticity test;—that is, the pressure required to close a mold. Plasticity itself should not be hard to measure, and is not, in ordinary types of compounds, but in the thermo-setting products the measurement of plasticity is complicated by the fact that, during the interval in which the plasticity is being measured, the product is also curing and tending to stiffen and set up.

Flow tests and extrusion tests are on this account, eliminated from the field. The theoretical value which it is desired to measure is the rate of flow of the material in grams per second plotted against time. It is easy to see that with an extrusion method which really measures the amount of material beneath the curve, that is, the total amount of material extruded, two entirely differently acting products may give the same answer. That is, a material which flows rapidly for a short time, and then sets quickly would give the same total amount of extrusion as a material which flows slowly over a long period of time.

Many different types of molds have been designed and tested in order to try out different methods of measuring this particular feature of a molding compound. The most satisfactory found in our laboratory to date, however, has been a method which is based fundamentally on molding practice. In the old days in the development of the molding industry when a molding compound was too stiff to be used, the molder merely blocked off one cavity of the mold and ran along under the reduced pressure. General Plastics' method of testing molding compound for plasticity does just that thing.

A multiple cavity mold is mounted in an ordinary semi-automatic press under constant steam and hydraulic pressure, as it is a well known fact that a slight variation in the steam pressure will cause a very large variation in the manner in which the material acts. Particular care is given to the draining of the mold and to a free working trap, for more trouble can be caused by a slight water logging of the mold due to a sluggishness of the trap than from any other feature. This not only applies to the testing of molding compound, but to the actual molding in the plant.

During the summer months when steam is dry and warm, very little trouble is had from this source but during the winter months when the steam is coming quite wet from condensation, there is considerable danger of a water logging which, however temporary, will affect the molding of the piece considerably.

The control of the hydraulic pressure is maintained by a closed system backing against a reservoir of nitrogen which gives and takes with the movement of the ram. Losses due to leakage in the system are being taken care of by a check valve connecting with an accumulated system.

The material to be tested is allowed to stay in the room until it has reached room temperature. This is particularly necessary in the cold weather when the sample may be brought in from out of doors. Very extreme results can be obtained from testing a cold sample and a warm sample is equally misleading. A definite weight of the material is loaded into the cavity of the mold. The maximum number of cavities on which a press will close with a fin of less than ten thousandths of an inch, is taken as the plasticity of this material.

Cure Tests

Three cure tests are run on the General Plastics' system. First, the blister cure is taken at a constant hydraulic pressure, that is 3000 pounds per square inch. The time of cure is taken as the time during which the mold is closed and the cure is timed to fifteen second intervals or in case of shorter cures, to ten second intervals.

Second, the time required to remove all the blisters at the minimum pressure on which the piece will close, is next taken; that is to say, if a compound

would close on 2000 pounds per square inch pressure, the blister cure is taken both on 3,000 and on 2,000 pounds. It is surprising what a difference there is between the two tests and how the relation varies with different types of compounds.

A material which on our testing device, requires five minutes cure on 2,000 pounds per square inch, may cure in as little as one minute on the 3,000 pound per square inch. It is very necessary to have both of these figures in order to correlate the expected results in a molding plant.

The third cure test is the deflection device. It is a well known fact, that while certain types of compounds will not blister, even in very short intervals of a few seconds, they are not thoroughly cured. The deflection device is not extremely accurate as the piece has to be taken from the mold quickly and placed in a heated cavity. This interval of time is an error which cannot be overcome under the present conditions. However, by placing the hot piece in a heated cavity and putting pressure on one side with a long lever, the deflection of the piece can be read on a scale which gives no deflection as 100% cure, and zero as the reading when the weight breaks through the molded tube base.

While the accuracy of this test is somewhat limited it is very indicative of different types of material and the three cure tests give a picture of the compound which makes it fairly easy to duplicate and to pick products for new work.

The fourth vital feature of the molding compound, that is, the finish, is tested by molding in a highly polished mold with a large smooth surface.

These four tests cover the bulk of the work necessary, and while many special tests such as the coverage of wood flour are run for individual cases, these four tests are the determining factors of the moldability of the finished product.

Photo by Bakelite Corp.

The Cameron Electro-Matonette

Molded Box, Tray and Handles Provide Resinoid Ensemble for Toilet Set

THE old saying is, "Goods well displayed are half sold." This psychological fact that appeal to the eye comes first is well recognized and exploited by the modern package designers. Most arresting are the packages in which product and container make a perfect ensemble. Usually the harmony of the whole is accomplished by color and design. The package in which the same material is used throughout is still rare enough to attract instant attention.

In many cases, it is not always possible to accomplish this perfect ensemble. With the Cameron Electro-Matonette outfit, the use of the same material —Bakelite molded resinoid— for handles and case, was desirable from the standpoint of both beauty and utility. This interesting toilet set consists of an electric razor and electric vibrators—scalp, face, dental, cuticle, and fingernail.

In designing the apparatus, handles of molded resinoid were decided upon because of their insulating ability as well as ease of molding and beauty of finish. There is no possibility of electric shock in the use of either razor or vibrators as the metal parts which come in contact with the face are not connected to the current wires. The electric current, conducted from the line voltage is protected by the Bakelite insulation, and the vibratory motion is mechanically transmitted to razor head or vibrator, insuring complete safety.

The colors of the handles, red, green, blue, purple, mahogany, and black, harmonize with the Bakelite molded box and compartment tray. Design and finish of the box are particularly attractive. A panel is provided on the cover for engraving name or monogram. The wide range of colors offer an opportunity to select a hue which will blend into any interior decoration scheme. In contrast to the rich lustre of the resinoid, all of the exposed metal parts are of solid dirigold, the new metal which looks and lasts like gold.

As an occasional box, to be used for a variety of purposes, the colorful molded container alone would make a perfect gift.

Technology of Cellulose Acetate

Progress in the Preparation of this Cellulose Ester as Shown in the World's Patent Literature during the last Decade.

By Dr. Aladin

Continuing this concise but comprehensive review of the world's patents on Cellulose Acetate which issued during the past decade, we now come to those patents which particularly relate to the

PRETREATMENT OF CELLULOSE

II. b. With alkalies and with oxidizing agents.

Serial No.	Patent No.	Patentee	Title	Brief of Description
21.	U. S. 1,379,699	H. M. Specht (W. T. Scheele)	Preparation of cellulose derivatives.	Cellulose is prepared for esterification by being treated with a mixture of hydrogen dioxide and sodium hydroxide; after which the alkali is washed out and the cellulose dried.
22.	U. S. 1,668,485	H. L. Barthelemy (to Ruth-Aldo Co.)	Preparation of cellulose esters.	The cellulose is treated with oxidizing agents in the presence of alkalies; or with alkali peroxides. In order to prevent formation of alkali cellulose, other substances, such as alkali carbonates, silicates, resinates, soaps or ammonia may be added. Cellulose acetate made from such cellulose has a low viscosity but high tensile strength.
23.	U. S. 1,711,110	H. Dreyfus	Preparation of cellulose acetate.	The patent describes the treatment of the cellulose by means of alkaline solutions having a concentration not over 3%; if a higher one is employed the solution must be cooled to prevent mercerization. The solutions may comprise caustic alkalies, carbonates, barium hydroxide, sodium aluminate or zincate, ammonia etc., which completely remove all liquocellulose, pentosans, resin etc. The thus prepared cellulose is then acetylated.
24.	Can. P. 267,551	H. Dreyfus	Preparation of cellulose acetate.	See U. S. P. 1,711,110 (No. 23).
25.	Brit. P. 249,177	H. Dreyfus	Preparation of cellulose acetate.	See U. S. P. 1,711,110 (No. 23).
26.	Brit. P. 282,794	Ruth-Aldo Co.	Preparation of cellulose esters.	See U. S. 1,668,485 (No. 22).
27.	Brit. P. 315,902	A. G. Pollard and J. R. Whincop	Preparation of a cellulose particularly suitable for preparation of cellulose acetate.	Retted and peeled plant fibers are treated with hot 3% alkali solution; or with chlorine followed by treatment with dilute alkalies.
28.	Fr. P. 604,062	H. Dreyfus	Preparation of cellulose acetate.	See U. S. 1,711,110 (No. 23).
29.	Fr. P. 638,903	Ruth-Aldo Co.	Preparation of cellulose esters.	See U. S. 1,668,485 (No. 22).
30.	Fr. P. 662,265	H. L. Barthelemy	Preparation of cellulose acetate.	Describes the various points that must be observed to obtain a good product. Employs careful oxidation of the cellulose (linters etc.) with sodium peroxide, hydrogen dioxide, other peroxides or perborates.

II. c. Pretreatment with Halogens, inorganic acids and acid chlorides.

31.	U. S. 1,478,137	W. Nebel	Preparation of cellulose acetate.	Cellulose is immersed in glacial acetic acid containing another acid, then withdrawn and the excess fluid removed by pressure. The acetation is then effected with acetic anhydride using zinc chloride as a catalyst. Hydrochloric acid is later added to hydrolyze the primary acetate obtained.

Serial No.	Patent No.	Patentee	Title	Brief of Description
32.	U. S. 1,503,604	P. C. Seel (Eastman Kodak Co.)	Preparation of cellulose esters.	Before esterification the cellulose is treated with a dilute mineral acid such as sulfuric acid, which is then again removed by washing with water.
33.	U. S. 1,668,483	H. L. Barthelemy (Ruth-Aldo Co.)	Pretreatment of cellulose to facilitate esterification.	Cellulose is treated with chlorine or bromine gas, the excess being then removed by a current of air. The product thus resulting is then treated with the vapors of acetic acid. The process may also be carried out in the reverse manner.
34.	U. S. 1,668,959	H. Le B. Gray and C. J. Stoud (Eastman Kodak Co.)	Preparation of cellulose acetate.	Raw cellulose, such as sulfite pulp, cotton waste and dust, etc., which contain polysaccharides, are treated at room temperatures with sulfuric acid of from 35-75% strength for about 24 hours; after which the resulting products are worked to neutrality and dried. Acetylation is effected with the aid of catalists such as zinc chlorides or with red phosphorous and chlorine.
35.	U. S. 1,679,966	E. S. Farrow Jr. (Eastman Kodak Co.)	Preparation of cellulose acetate.	Deals with the pretreatment of the cellulose with a highly concentrated hydrochloric acid (30-35% HCl). The process is interrupted after 5-6 hrs., i. e. before substantial saccharification takes place.
36.	U. S. 1,683,347	H. Le B. Gray and C. Stoud (Eastman Kodak Co.)	Preparation of chloroform soluble cellulose acetate.	Cellulose is first treated with glacial acetic acid containing 10% (on the weight of the cellulose) of a mixture of sulfuric and phosphoric acids). The temperature is maintained below 40°, whereby a slight acetylation occurs. The mixture is then completely cooled, and acetic anhydride is added. The reaction is completed by heating to 35-60° C.
37.	Ger. P. 482,727	S. A. Ogden	Preparation of cellulose derivatives.	Cellulose is converted, by treatment with 40-55% sulfuric acid at a temperature near but not exceeding 70° C. into an irreversible colloid, which is then washed and dried, yielding a hornlike mass. The product may serve as the raw material for making cellulose acetate.
38.	Brit. P. 246,476	S. A. Ogden	Preparation of cellulose derivatives.	See Ger. P. 482,727 (No. 37).
39.	Brit. P. 298,087	Heberlein & Co. A.-G.	Preparation of cellulose esters.	Cellulose, prior to its esterification, is treated with acid or neutral swelling agents such as concentrated inorganic acids, zinc chloride, calcium thiocyanate. After swelling the reagents are removed and the acetation carried out by addition of acetic anhydride.
40.	Brit. P. 303,134	Ruth-Aldo Co.	Pretreatment of cellulose to facilitate esterification.	See U. S. 1,668,483 (No. 33).
41.	Brit. P. 308,348	G. W. Miles (British Celanese Ltd.)	Preparation of cellulose esters and ethers.	Cellulose is treated with hydrofluoric acid before esterification or etherification.
42.	Brit. P. 312,098	H. Dreyfus	Preparation of cellulose esters, artificial silk and plastic masses.	This patent incidentally describes the pre-treatment of the cellulose with acid reagents such as the halogen acids, or mixtures thereof with organic acids such as acetic acid.
43.	Fr. P. 525,738	Cellulose et Papiers (Societe de Recherches et d'Applications)	Preparation of cellulose acetate.	Before acetation cellulose is treated with chlorinating reagents.
44.	Fr. P. 592,760	S. A. Ogden	Preparation of cellulose acetate.	See Ger. P. 482,727 (No. 37).

Serial No.	Patent No.	Patentee	Title	Brief of Description
45.	Fr. P. 660,393	Ruth-Aldo Co.	Pretreatment of cellulose for esterification.	See U. S. 1,668,483 (No. 33).
46.	Fr. P. 660,794	Heberlein & Co. A.-G.	Preparation of cellulose esters.	See Brit. P. 298,087 (No. 39).
47.	Aus. P. 87,646	R. Wolffenstein and A. Marcuse	Preparation of cellulose derivatives.	Cellulose is treated with thionyl chloride which facilitates the succeeding esterification. Alternatively the thionyl chloride may be added to the acetylating mixture.
			II. d. Pretreatment with organic acids.	
48.	U. S. 1,466,401	E. I. Du Pont de Nemours & Co. (J. M. Kessler & V. B. Sease)	Preparation of cellulose acetate.	A mixture of glacial acetic acid and acetic anhydride is forced through cellulose under high pressure to saturation; whereafter the cellulose is acetated as usually.
49.	U. S. 1,543,310	Societe Chimique des Usines du Rhone (J. Altwegg)	Pretreatment of cellulose prior to esterification.	Cellulose is first treated with such small amounts of glacial acetic acid that the water contained in the cellulose will dilute the acid to a strength of about 70-80%; this facilitating the subsequent acetation. Then greater amounts of glacial acetic acid are added (containing 0.5% sulfuric acid) and the mixture is heated 3 hours to 45° C., after which the acetic anhydride is added and the acetylation completed at 50-60° C.
50.	U. S. 1,668,484	H. L. Barthelemy (Ruth-Aldo Co.)	Preparation of cellulose acetate.	Cotton is impregnated with acetic acid vapor while being stirred. The mixture thus resulting is cooled down and then has an acetylating mixture added to it which contains only a fraction of the acetic anhydride required; the balance being added gradually during the acetation.
51.	U. S. 1,668,944	H. T. Clarke and C. J. Malm (Eastman Kodak Co.)	Preparation of cellulose fatty-acid esters.	Cellulose is heated with an anhydrous fatty acid (say acetic acid) to the boiling point thereof (acetic acid =117° C.). The resulting ester is stable on boiling with water and can be further esterified with acetic anhydride or acetyl chloride.
52.	U. S. 1,668,945	H. T. Clarke and C. J. Malm (Eastman Kodak Co.)	Esterification of hydrated cellulose with lower fatty acids.	A hydrated cellulose such as viscose, cuprammonium cellulose or denitrated cellulose nitrate is heated with an anhydrous fatty acid, e. g. glacial acetic acid under pressure to 100-170° C.—without the use of any catalysts or acetic anhydride. The resulting product can be further acetated with acetic anhydride and a catalyst.
53.	U. S. 1,671,513	Societe Lyonnaise de Soie Artifiicielle (M. Cusin and P. H. A. Chevalet)	Preparation of cellulose acetate.	Cellulose is treated with strong formic acid with or without addition of sulfuric acid or zinc chloride. The product is then worked and dried, and then treated with the usual acetylating agents.
54.	U. S. 1,687,059	H. T. Clarke and C. J. Malm (Eastman Kodak Co.)	Esterifying mercerized cellulose with lower fatty acids.	Mercerized cellulose, without the use of a catalyst, is heated with glacial acetic acid to above 100° C., whereby after 48 hours treatment it will be found that about 8% of the acetic acid has been combined. The product may be treated in a second phase, with acetic anhydride etc. with a catalyst.

The balance of the 235 patents on Cellulose Acetate manufacture will appear serially in the pages of this magazine during 1931. No similar complete compilation on this subject is available anywhere. PLASTICS has the exclusive publishing rights to these articles.

Laminated Plastics Find Many Uses in Industry

LAMINATED resinoids in industrial fields are giving a splendid record of performance. When examples of their use are sought, the difficulty lies only in selection and elimination, the interesting applications being so numerous and varied. Reasons underlying this extensive use are the desirable properties of the laminated resinoids, their adaptability to many kinds of service, and the forms in which they are furnished—sheets, rods, and tubes—fundamental types in all construction.

A spectacular application is found in the use of a laminated tube to insure the dependability of a 220,000 volt oil circuit breaker. This tube is eight feet long and over a foot in diameter. Bakelite laminated material was chosen because its strength enables it to resist the great torsional stresses imposed upon the center rotating unit. It is also resistant to oils and extremely high voltages. Sheaths of the same material are used for the steel tubes which form the horizontal and vertical units to which blades and contacts are fastened.

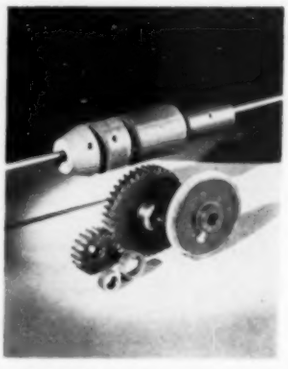
A tube of laminated resinoid, eight feet long and over one foot in diameter, forms the center rotating unit of a 220,000-volt oil circuit breaker.

Another example of engineering choice of laminated resinoid because of strength and insulating ability is found in the use of Bakelite laminated bases for 4,500-ampere disconnecting switches. If made of any other insulating material than the laminated resinoid, the base of a 4,500-ampere, 440-volt disconnecting switch would be almost sure to fracture through the heavy shocks of opening and closing.

In a photo copying machine, parts that come in contact with the hyposulphite of soda in the developing bath must be of a material which resists destructive corrosion. For the operation of the rolls in the developing bath, a train of laminated resinoid gears provided freedom from corrosion, and also assured quiet operation. A special Bakelite material was also used for the wheels of the submerging device.

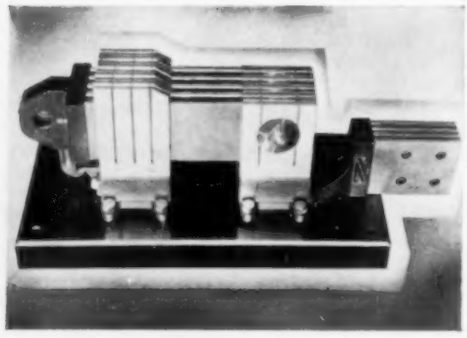
Wherever silent gears are desired, the material from which they are constructed is usually found to be of laminated resinoid. The use of silent resinoid gears in the automotive timing train is the early and still classic example.

Proof of the durability and continued silence of operation of laminated gears is found in the electric hoist pinion gear which, after four years of almost daily use in a foundry in Pennsylvania, was taken apart for inspection and found to be in excellent condition.



Bakelite laminated parts used in the construction of a photo copying machine, the "Rectigraph".

For sewing and working table tops in the textile industry, seamless sheets of laminated resinoid give the highest satisfaction.



The Bakelite laminated base of a 4,500-ampere disconnecting switch guards against danger of fracture of the base through heavy shocks of opening and closing.

Ornamental Effects Obtainable by Efficient Use of the Various Modern Plastics

Almost the entire gamut of human needs has been touched by plastic materials

By Charles W. Rivise

CONTINUING from page 219 of the March issue, we reproduce here a further number of patents showing the use of plastics for obtaining ornamental effects.

57. F. H. Tupper. 1,637,362; Aug. 2, 1927. Filed Mar. 29, 1924. States that it was the practice to mold on an additional piece of material to form a bead or boss on a facing sheet of wood.

Invention is illustrated as a radio panel having central layers of impregnated felted material such as cotton and facing sheets made of wood veneer or comminuted impregnated molding mixture. By subjecting this material in a mold to heat and pressure and forming a countersunk portion in the backing sheet, a corresponding shape is formed in the felted layers and the facing material in the opposite sheet flows into a molded form such as a bead or boss. States that when the covering sheets of wood are of the same thickness and the grain is parallel in both facing layers, a perfectly plane surface results, but where the grain in one surface sheet is at an angle to that in the other, the panel warps. The same result is obtained by making one facing sheet thicker than the other. Some of the claims include this feature, while some call for a method of molding beads in wood or molded articles.

The kind of binder is not stated.

58. J. Chaloupka. 1,657,057; Jan. 24, 1928. Filed Feb. 17, 1925. An ornamental fabric is made as follows:

The fabric such as gauze, silk, etc., is supported in a frame above a receptacle containing plastic urea formaldehyde resin. A frame containing spaced needles is pressed against the fabric so that their points pierce the fabric and dip into the synthetic resin. When the needles are withdrawn, beads or globules of synthetic resin remain on the bottom of the fabric in spaced relation.

While the individual articles described are taken from patents, even those not particularly learned in chemistry and physics may read them with much profit—for many suggestions may be garnered from them, and thus the application of plastics to still other uses made possible.

We know of no place where similar information can be obtained with so little effort as from such compilations as this. The effort involved in collecting this data, is, however very great indeed.

59. F. E. K. Steppes. 1,658,359; Feb. 7, 1928. Filed Aug. 19, 1926. A glass-like composition capable of being colored in imitation of opal glass, porcelain, alabaster, bone, all kinds of precious stones, beads and ornamental articles such as fancy goods, dishes, etc., is made by dissolving urea in polymerized formaldehyde and heating.

60. W. F. Grupe 1,667,689; April 24, 1928. Filed May 24, 1926. A transfer medium for impressing material such as Bakelite, hard rubber, cork composition, wood, silk, paper, etc., with bronze or other metallic powder in imitation of gold, silver, or other metals or with ink impressions of desired colors is disclosed consisting of a carrier strip of glassine, a layer of metallic powder mixed with a potentially reactive phenol plastic and an outer layer of shellac with or without a filler as chalk, rice starch, etc.

61. C. Ellis. 1,685,355; Sept. 25, 1928. Filed Oct. 25, 1924.

Streak-ribbed product is made in the following manner:

Sheets of paper of different colors are impregnated with synthetic resins of different colors, superposed, hot pressed to form a block; the block is cut transversely to form thin strips and the strips are assembled edge-wise and laminated. The synthetic resin may be made by dissolving urea in formaldehyde and adding phthalic anhydride with or without molten phenol or by causing acetone to react on formaldehyde.

62. M. Hilfreich. 1,668,590; May 8, 1928. Filed April 22, 1927. Block of artificial resin having differently colored layers suitable for cigarette holders is made by positioning colored blocks or plates made of resinoid material in a mold, pouring liquid resinoid of another color thereabout and hardening the entire mass. Patentee states that previously variously colored layers have been screwed or stuck together by liquid synthetic resin.

F. B. Root, 1,689,892, Oct. 20, 1928. Filed July 13, 1928.

A wrinkling finish is described containing among other ingredients China wood oil and a resin such as Congo, Cumar or a synthetic resin as phenolic

condensation product or glycerol-phthalic anhydride condensation product.

C. J. Hall and G. C. Kent, 1,697,182, Jan. 1, 1929. Filed Oct. 4, 1924.

This patent discloses an improvement on the prior methods of molding designs on material impregnated with a heat hardenable binder as phenolic condensation product. The prior methods consisted in placing a sheet of paper upon which the design is printed between sheets of impregnated tissue paper and molding with heat and pressure. This method produces dark colored backgrounds which are not satisfactory where considerable contrast between the design and background are desired. Furthermore in using this method on thin molded articles, the print is apt to break apart in molding.

In the present method two sheets of an impregnated fabric such as cambric of light color is placed upon the base which may consist of a plurality of impregnated sheets of fibrous material; a sheet of impervious unimpregnated parchmentized paper such as fish paper is superposed and then covered with a sheet of unimpregnated paper carrying a design and a sheet of impregnated paper such as jap paper or tissue paper after which the assembly is consolidated by heat and pressure.

F. Seebach, 1,720,062, July 9, 1929. Filed Feb. 6, 1926.

A composition from which may be manufactured cigar mouth-pieces, pipe bowls, jewels, rings, etc. is made by mixing unstable colloidal solutions of phenol formaldehyde resins with porous filling materials such as clay, infusorial earth, sand, glass, wood, cotton, asbestos, wood, sawdust, silk, pumice stone, etc. and precipitating the synthetic resin by means of water.

F. B. Root, 1,732,661, Oct. 22, 1929. Filed May 25, 1927.

A wrinkled finish is produced on an article by coating with a composition containing rosin, red lead, borate of manganese, China wood oil, blown wood oil,

toluol and a resin such as Congo, kauri, dammar or Cumar. Light naphtha, heavy naphtha and turpentine may also be included in the mix.

H. N. Copeland, 1,735,674, Nov. 12, 1929. Filed Oct. 4, 1926.

Ornamental surfaces of variegated design and pleasing appearance somewhat in imitation of natural onyx, agate, marble, etc. are produced upon molded articles in the following manner:—

Various sizes of pieces of phenol plastic materials of different colors and of different fusing points, some of which may be translucent and others opaque, are intermixed, subjected to heat whereby the different materials are fused to different degrees and molded under pressure to cause the interspaces and surface irregularities of the less fluid material to be filled by the more fluid differently colored material.

H. P. Mills, 1,742,516, Jan. 7, 1930. Filed Sept. 29, 1925.

Surface markings such as letters, symbols, signs or ornamentations of any kind are produced by the following method on molded articles:—

The face of the mold, or in the case of laminated stock the burnished plate of copper or other metal against which the stock is pressed, is engraved with the desired design. The lines in the mold or in the metal sheet are then filled with a molding mixture comprising a reactive phenol resin and a coloring material as gilt, bronze or other metal powder. The metal plate or die is then pressed against the laminated or molded article which has preferably been partially precured. A variation consists in printing the desired design on the copper sheet with an ink comprising a phenol resin molding mixture. Another variation consists in printing upon an already impregnated fibrous sheet which may have been partially precured.

F. P. Brock, 1,747,574, Feb. 18, 1930. Filed June 28, 1926.

Grained effects are produced

in molding composition by commingling a potentially reactive resin binder, a filler such as wood flour and coloring material, the latter in the form of discrete particles and extruding the mixture through slots or perforations into an elongated preformed mass of variegated color without substantial reaction thereof. The product is a reactive resin mass showing irregularly disposed lines of color simulating graining and cloud effects.

Patentee refers to prior methods of producing varigated effects by blending the colors with the resin mass less thoroughly than necessary to produce homogeneous color.

K. Ripper, 1,779,047, Oct. 21, 1930. Filed Nov. 8, 1926.

Porous homogeneous cloudy plastic compositions simulating meerschaum are made in the following manner:

A condensation solution of urea and formaldehyde is diluted so as to contain a large proportion of dispersion medium, the amount of diluent being less than the necessary to prevent gelatinization, gelatinizing the solution at about 50°C with acids or acid producing substances in very small amount and permitting jelly to harden in the presence of most of the dispersion medium.

Foreign Patents

Austria 94,216, July 26, 1921.

Liquid or fused plastic composition of the phenolplastic type is poured into a mold in layers of different colors and hardened to produce variegated and mottled effects.

Austria 95,805, Sept. 24, 1921.

A tortoise shell substitute is made by heating a colored or uncolored phenol resinoid to 70-80°C. until only partially soluble, breaking up into irregular pieces, mixing with other colored or uncolored liquid phenoplastic and hardening as usual in molds.

British, 23,789/ 1906.

Albuminous matter is treated with sodium chloride and electrolyzed by means of metallic electrodes to produce a material

French Plastic Molding Presses

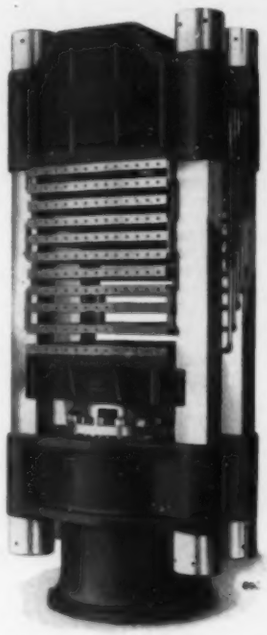


Fig. 890. 1200 Ton Press For Laminated Sheets

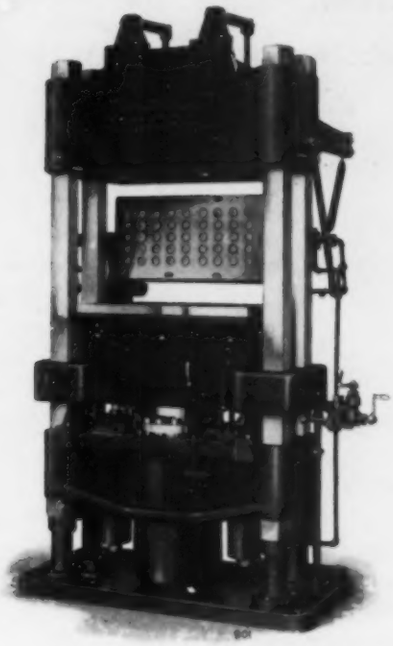


Fig. 901. 180 Ton Tilting Head Molding Press

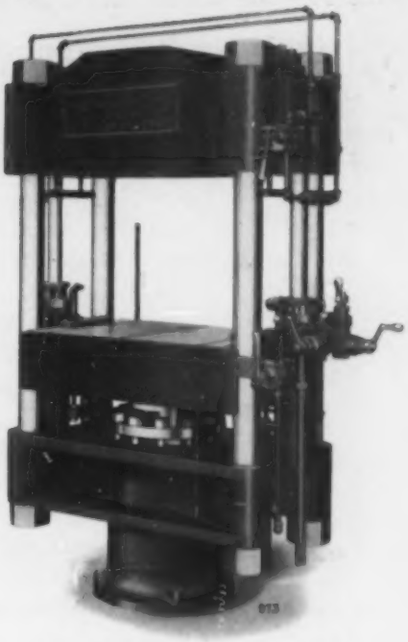


Fig. 973. Molding Press With Hydraulic Knock-outs Positive Force Up and Down

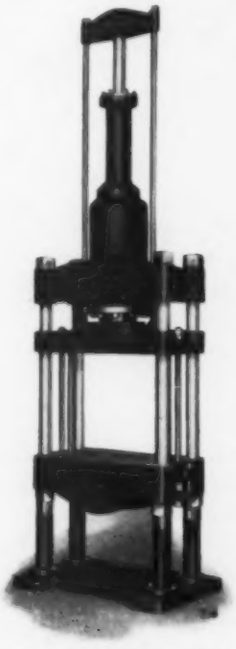


Fig. 756. Inverted Type Semi-Automatic Molding Press

THE French Oil Mill Machinery Co. manufactures all sizes and types of hydraulic press equipment and has contributed much to the development of equipment for the molding industry. Hydraulic presses are positive and develop known pressures. They are notoriously long lived. They unquestionably are suitable for deep as well as flat molding. Improvements and developments in hydraulic design have eliminated troubles which used to occur when such equipment was in an undeveloped state. Many operations not only in molding but in high speed production work are being changed from mechanical and air operated equipment to hydraulic press equipment. Whatever your press equipment requirements may be, give us an opportunity to figure with you.

Catalog gladly mailed on request.

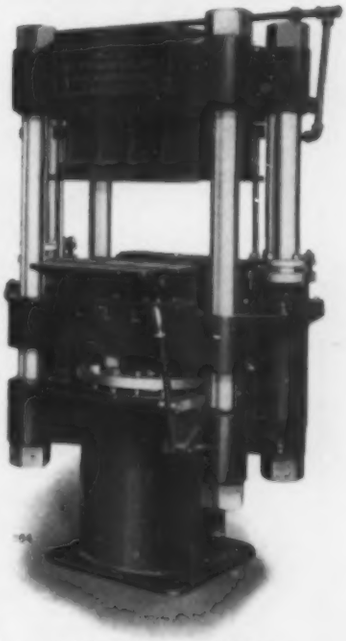


Fig. 784. Semi-Automatic Molding Press Lever Release for Knock-outs

THE FRENCH OIL MILL MACHINERY CO.

PIQUA, OHIO

At the Chemical Exposition

The visitor interested in plastic materials and the accessories required in their production and utilization, can use this list as a partial guide.

BOOTH	COMPANY	PRODUCT
493	American-British Chemical Supplies, Inc.	See page 288
246-247	Bailey Meter Company	Recording Instruments
17	Bakelite Corporation	See front cover
d3	Baker Perkins Co., Inc.	See page 272
89	Beach-Russ Co.	Pumps
434	Becker, Moore & Co., Inc.	See page 304
83-84	Bristol Company	Recording Instruments
40-41	Brown Instrument Co.	Recording Instruments
5-6	Buffalo Foundry & Machine Co.	Processing Equipment
22-21	Carborundum Company	Abrasives
534	Carpenter Container Corp.	Containers
209	Fred S. Carver, Inc.	See back cover
535-536	Continental-Diamond Fibre Co.	Laminated Products
242-243	Celluloid Corporation	See inside back cover
536	Chicago Mica Company	Mica
275	Chromium Corp. of America	Chromium
343	Arthur Colton Co.	See page 298
567	Crystillin Products Corp.	See page 250
56	Eastman Kodak Company	See page 269
49	Charles Engelhard, Inc.	Recording Instruments
536	Fibroc Insulation Co.	Laminated Products
3-4	General Electric Company	See page 248
71	General Plastics, Inc.	See page 247
292	Glyco Products Corp.	Synthetic Resins
45	B. F. Goodrich Rubber Co.	Thermo-plastic Rubber
204-205	Hercules Powder Co.	Nitrocellulose
12	Johns-Manville Corp.	Asbestos
493	Kay-Fries Chemicals, Inc.	Plasticizers
51	Koppers Products Co.	Chemicals
526	Marblette Corp.	See page 267
274	Quaker Oats Company	Furfural
12	Proctor & Schwartz, Inc.	Drying Equipment
263	Pulverizing Machinery Co.	Pulverizing Machinery
67	Raymond Brothers Pulverizer Co.	Pulverizing Machinery
267	Stokes and Smith Company	Durite Plastics
77	F. J. Stokes Machine Co.	See page 290
30-31	Struthers Wells Co.	Processing Equipment
275-276	United Chromium, Inc.	Chromium
91-92	U. S. Steel Corp.	Steel
70	Vanadium Corp. of America	Steel
528	Watson-Stillman Co.	Hydraulic Presses
208	Weston Electrical Instrument Co.	Recording Instruments

and

436 Plastics Publications, Inc. Plastics & Molded Products

See Announcement on Inside Front Cover

British, 187,065, Oct. 17, 1922.

Urea and not more than 120% of formaldehyde are condensed in the presence of at least 3% of an acid as nitric, sulphuric or hydrochloric to produce a porous product that may be impregated with coloring materials, oils, resins and salts. Product is said to be turbid and suitable as porcelain and meerschaum substitute.

British 207,144, Nov. 15, 1922

Elongated light reflecting particles such as essence d'Orient, mica, metal or short filaments are incorporated into compositions containing celluloid, casein or synthetic resins. The particles may be oriented by stirring, torsion, forcing or drawing. Transparent veins may be produced by adding material not containing the particles and coloring material may be added if desired. Specification as open to inspection also mentions the addition of bubbles of gas.

British 222,881, Oct. 4, 1923.

Artificial mother of pearl is made by incorporating very fine crystals into gelatin, celluloid, viscose, cellulose acetate or synthetic resins. The crystals may be produced by precipitating fatty acids from soap by water, or uric acid from sodium urate by an acid. Crystals from heavy metal salts are preferred as they have an index of refraction as different as possible than the plastic. The specification as open to public inspection suggests adding gas bubbles, either by chemical means or by the introduction and subsequent dissolution of crystals leaving interstices having the shape of the crystals.

British 223,461, Jan. 29, 1924.

Artificial stone is given an ornamental or protective coating by means of a phenoplastic solution to which coating may be applied a decorative material such as metal powder, gold leaf, wool dust, or glass powder.

Editors' Note:—Mr. Rivise's series will continue in the next issue of *Plastics & Molded Products.*

"Sea-Caoutchouc"---A New Plastic Base from Sea Weeds

IN connection with the recent articles on the utilization of sea-weeds by Maurice Deschiens, it will be particularly interesting to note that the alginates are apparently capable of vulcanization producing what the discoverer of this property of the sea-weeds terms "Sea Caoutchouc".

Now that several firms are actively engaged in producing alginic acid and alginates from the abundant supplies of the giant kelps on our Pacific Coast, such processes may be of more than mere scientific importance.

A French Idea

The inventor Mr. Charles A. Houques-Fourcade, of Bordeaux, France, described his process in his French patent application of Oct. 9, 1926, on the basis of which an application was filed in the United States Oct. 8, 1927, now matured into U. S. P. 1,772,218; Aug. 5, 1930.

According to the invention, the sea caoutchouc is extracted from the sap contained in the sea plants, by treating consequently all the sea-weeds, which although of different forms all contain sap, but by treating particularly the weeds known as the Laminaria and the giant kelp of California.

Due to the ever increasing India rubber consumption, the present invention offers great advantages, since huge quantities of sea caoutchouc may be manufactured at a very low cost price and same is susceptible of being substituted to common caoutchouc in its various applications and especially in the manufacture of motor car tires, artificial leather, linoleum, constructional pieces, etc.

For the obtention of the caoutchouc according to the invention, one of the following ways of working may be followed:

One way of working consists in dissolving the sea weeds with water in heated boilers, preferably water containing alkaline, such as Solvay soda carbonate in the proportion of 5 to 10% of the weight of the sea weeds. When the dissolution is completed, the material obtained is placed in a rotary sieve which leaves passage only to the liquid part and thus the non-dissolved parts of foreign substances are eliminated.

The viscous liquid obtained is then placed into a kneading mixer or a high speed centrifuge, and a solution of sulphur of chloride with carbon disulphide carbon tetrachloride, benzene or other solving agent for sulphur in a proportion of 2 to 25%, this proportion of sulphur dichloride varies according to the species of the sea weeds employed.

Sulphur dichloride might be employed single, but it has been found preferable to make use of a solution of this sulphur dichloride which allows of the obtainment of a product having a better appearance.

After kneading for some time, the substance becomes livered and the elastic flaky dough obtained is then centrifugalized.

Acts Like Rubber

The resulting dough, which is sea caoutchouc, can be manufactured, pressed, made into bars, drawn into wires and it may be given any desired shape such as are made use of in the caoutchouc industry.

Another way of working differs from the preceding in this that after complete dissolution of the sea weeds and separation of the liquid parts, the dough is poured rapidly, at a temperature above 113° C., into a tank containing sulphur, in the proportion of 5 to 10% of sulphur, if soft caoutchouc is to be obtained; for the obtainment of harder caoutchouc the proportion is increased,—the liquid and sulphur are stirred together for a suitable lapse of time, the progress of the operation being apparent by the thickening of the mixture, and an india rubber dough is obtained as in the preceding case.

According to a third process, after dissolving and separating the liquid parts, these are poured into a high speed centrifuge and, by adding simultaneously a coagulating reagent for colloids such as acetic acid, a coagulum is obtained which is in turn treated with sulphur dichloride as in the first process, or by sulphur as in the second way of working.

It is to be noticed that sulphur dichloride could be replaced by antimony sulphide or other sulphur compound.

Some Modifications

Another method consists, after dissolving and separating the liquid parts, in diffusing into the dough simultaneously or in succession, sulphur dioxide and hydrogen sulphide.

The substance obtained is similar to the common caoutchouc, it can be vulcanized as the latter, but of course the temperature and vulcanizing duration may vary according to the species of the sea weeds employed which can be widely different the ones from the others.

According to the above mentioned processes, it is of no importance that the caoutchouc producing sea weeds be selected when they are mixed with caoutchouc non-yielding sea weeds, since their separation takes place automatically.

A cold process could also be used in which the sea weeds would be crushed, for instance in a grind stone crusher, with water containing alkaline or not, the separation taking place afterwards.

An advantage of the process resides in that the water which has been in contact either with the sea weeds or with the dough

can be collected for the extraction of all the salts contained in the sea weeds, such as: potassium, chloride, and sodium chloride, and especially iodine, which constitutes a source of large profits.

Obviously the qualities (color, elasticity, compression) of the caoutchouc obtained, will vary according to the coagulating process employed, centrifugation ar coagulating re-agents, way of manufacturing of the caotchouc, and whether sulphur, sulphur dichloride, and-timony trisulphide, hydrogen sulphide sulphur dioxide or any other sulphur compound, is used, but, in all cases, the sea caoutchouc may be employed, either pure or mixed with common caoutchouc.

Various detail modifications may of course be made in the above processes without departing from the scope of the invention, and, in particular linseed oil, olive oil, etc., could be incorporated to the solution containing sea weeds; similarly, and in order to eliminate the excess of sulphur or the chlorhydric acid produced during the treatment, the dough could be worked with acetone, carbone disulphide, benzene, carbon tetrachloride, etc. To insure a perfect preserving of the manufactured articles, the dough from which these articles are made could be mixed with a solution of anilin or phenol at 3%, of glycerin and gelatin at 5% and eventually with potassium dichromate, formol of tannin.

"Dry Ice" Molding Powder

(*Continued from page 258*)

the tablets thus formed to stand at room or elevated temperature, the dry ice will vaporize and the reaction will ensue. The same tablets or, for that matter, comminuted powder may be placed into a die and the die may be heated to any desired temperature, when the dry ice will be quickly vaporized and the reaction take place. Under these conditions of molding and

at a temperature of about 300° F. on the die a 1¼" diameter disc by ¼" in thickness was molded to its final hard, set and infusible form in about ¼ minute curing time and the product was so completely cured that it could be removed from the die without cooling. The amount of wood flour, of course, and the amount of dry ice may be varied considerably in order to take care of the desired type of product and also to take care of the lag in operations.

Example No. 2

Resorcin	1.80
Paraformaldehyde	.915

All parts by weight. Place in a suitable digester provided with a stirring device and heat gradually until a reaction ensues. This will take place at a temperature of somewhat less han 212° F. The reaction, however, is very energetic and cannot well be controlled by cooling from the outside of the digester and therefore a suitable amount of carbon dioxide ice in finely comminuted form is thrown into the reacting mass, whereby the product is cooled below room temperature and a resinous product useful for subsequent molding may be maintained. Suitable solvents may be added either before or after the ice application if a varnish is desired. The product may now be used as a varnish or lacquer or may be incorporated with various products such as, for example, pyroxylin lacquers or may be mixed or impregnated into suitable filling materials. The product is extremely reactive and will continue its reaction at room temperature without bubbling and will produce a clear, transparent, strong, resinous product. While preferably maintaining the cooling until the final molding operation, by either applying external cooling means or by the additional application of carbon dioxide ice the mass may be utilized for various molding operations.

Resinoid-Imbedded Museum Specimens

Interesting Possibilities Disclosed By New Process of Preserving Flowers, Beetles, Butterflies and Small Animals

A use for the resinoids that is quite off the beaten path, but which presents some interesting possibilities, was patented about five years ago. It has not heretofore been mentioned in plastics, having but recently come to our attention during a somewhat intensive search through the patent literature on the phenolic resins.

According to this patent, which was filed Feb. 28, 1925, and in Austria Nov. 14, 1923, (U. S. P. 1,588,164; June 8, 1926), Josef Brunner and Erich Scheele, of Brunn am Gebirge, Austria, the inventors, discuss various methods used in the past and then describe their process.

A novel line of products could be made by the process described in this article. We can conceive of some rather striking ornaments and pendants containing a permanently imbedded glittering beetle or a gorgeous butterfly.

Preserving Insects

"The production of physiological preparations by means of methylated spirit has considerable disadvantages. The stability of the preparations is slight. The unwieldiness and danger of breakage of the glass vessels, the poor adaptability for transport, the liability to catch fire and the volatility of the methylated spirit are further important disadvantages of this method of preservation. Many of these disadvantages also appertain to preparations preserved with formaldehyde. The drying up of insects held on needles also is a defective method of preserving, for the insect bodies in time become brittle, can be damaged by a slight touch and collapse after a short time. Endeavours to imbed animal and vegetable bodies in transparent solid bodies have not led to any satisfactory result. The soaking of the animal bodies with resin and paraffin does not produce permanent preparations, the containing case is also combustible and not capable of withstanding shocks and blows. The imbedding in celluloid, colloxylin, resin, and the like produces combustible preparations which shrink by reason of the evaporation of the solvents, and are not sufficiently solid.

"The present invention relates to the production of manipulable preparations of great durability, which are also transportable and resistant and non-combustible.

Phenol Resins Used

"The condensation products of formaldehyde and carbolic acid and of formaldehyde and urea have been found, as shown by experiments, to be particularly suitable as imbedding masses for animal and vegetable bodies. Animal bodies soaked in these condensation products are of great durability due to the strongly disinfecting action of the formaldehyde and of the carbolic acid, which initial components of the condensation products are always contained therein in small quantities in an unchanged condition. The use of these condensation products capable of being hardened by heating also has the advantage that preparations of very great firmness are obtained.

"All artificial resins are suitable which for example are prepared from phenol and phenol derivatives on the one hand and aldehydes on the other hand, further from methyl chlorides and phenol, from sulphur and phenol, from aromatic amines and sulphur, from urea and its derivatives and aldehydes, from furfural and acetone, from aldehydes and aromatic amines.

"Not only insects and plants, but also amphibia, reptiles, fishes, crustacea and so forth may be preserved with artificial resins. The preparations thus produced are very resistant to shock and are applicable to the production of ornamental and decorative articles.

"In certain animal groups for example reptiles it is advisable to remove the water from the animals by placing them in alcohol. In such a case the addition of formaldehyde is advantageous.

"Explanatory examples:—

"1st Example. An insect, for example, a beetle, has a needle passed therethrough and is dried for some days. The needle, which carries the insect, is then pressed into the bottom of a mould of wood or paste board and a thin flowing condensation product of formaldehyde and carbolic acid or of urea and formaldehyde is poured into the mould until the insect body is covered.

If after pouring in the resin air-bubbles remain on the insect these can be removed by the use of a vacuum before the resin hardens. In this manner the air is also withdrawn from the interior of the body and the resin mass penetrates into it. The liquid condensation product enclosing the insect body is

converted into the solid and insoluble condition by heating. The insect is obtained in a transparent very hard mass which can be ground and polished. If it is not desired to also embed the needle the insect may first be secured to a thin layer of resin and then become completely enclosed by the further addition of resin.

Ownership Statement

Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912 of Plastics published monthly at Washington, N. J., for April 1, 1931.

State of New York, County of New York ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. C. Gilmore, Jr., who, having been duly sworn according to law, deposes and says that he is the Business Manager of Plastics and Molded Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Plastics Publications Inc., 114 E. 32nd Street, New York City; editor, Carl Marx, 114 E. 32nd Street, New York City; managing editor, Nicholas Klein, 114 E. 32nd Street, New York City; business manager, R. C. Gilmore, Jr., 114 E. 32nd Street, New York City.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.) Plastics Publications Inc.: R. C. Gilmore, Jr., 114 E. 32nd Street, New York City; R. C. Gilmore, Sr., 114 E. 32nd Street, New York City; Carl Marx, 114 E. 32nd Street, New York City; A. K. Gilmore, 114 E. 32nd Street, New York City.

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5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is .....
(This information is required from daily publications only).

R. C. GILMORE, JR.
Business Manager.

Sworn to and subscribed before me this 30th day of March, 1931.
(SEAL) JAMES J. DOOLEY
My commission expires March 30, 1932.
Form 3526—Ed. 1924.

TECHNICAL ABSTRACT SECTION

A Review of Literature and Patents

Blood Plastic. Felix Homberg, assignor to American Nuplax Corporation, of New York, N. Y. U. S. P. 1,786,488; Dec. 30, 1930.

1. A process for the manufacture of moulded objects from dry blood comprising intimately mixing dry blood and an insoluble inorganic filling material adapted to render the object permeable after moulding, moulding the powdered mixture into a solid object by the application of heat and pressure, and subsequently treating said moulded object with a coloring agent.

2. A process for the manufacture of moulded objects from dry blood comprising intimately mixing dry blood and an insoluble inorganic filling material adapted to render the object permeable after moulding, moulding the powdered mixture into a solid object by the application of heat and pressure, and subsequently subjecting said moulded object to the action of a bleaching agent.

Phosphoric-Acid Solution of Cellulose. George W. Miles and Camille Dreyfus, assignors to Celanese Corporation of America. U. S. P. 1,787,542; Jan. 6, 1931.

8. A process for obtaining a solution of cellulose which comprises mixing the same with phosphoric acid of from 75% to 100% strength, allowing the mixture to stand for several hours until the desired solution of the cellulose is effected at a temperature of from 30° to 50° F., thereafter adding a substance having the formula $C_nH_{2n+1}R$, in which R stands for OH or COOH, and allowing the mixture to stand for several hours longer and n is at least 1.

11. A process for obtaining a solution of cellulose which comprises mixing the same with phosphoric acid of from 75% to 100% strength, thereafter adding glacial acetic acid, and allowing the mixture to stand.

Coloring Cellulose Esters and Ethers. Max Joseph Theumann, assignor to E. I. du Pont de Nemours and Company, of Wilmington, Delaware. U. S. P. 1,789,122; Jan. 13, 1931.

A solution of cellulose acetate in acetone is colored by means of eosine. To the homogeneous solution is progressively added, with stirring, a slight excess of lead acetate in aqueous solution. When the addition is completed, stirring is continued so as to obtain a homogeneous mass; the red-colored cellulose acetate is then precipitated, with water for instance, washed and dried. In this manner a red cellulose acetate is obtained with which varnishes, films or plastic materials may be prepared, the coloration of which resists the action of water.

Coloring Cellulose Esters and Ethers. Max Joseph Theumann, of Lyon, France, assignor to E. I. du Pont de Nemours and Company, of Wilmington, Delaware. U. S. P. 1,789,121; Jan. 13, 1931.

Example I: 100 grammes of cellulose acetate are dissolved in 500 grammes of acetone and a concentrated solution of 5 grammes of ferric chloride is added while stirring. When the mixture is homogeneous, 6.5 grammes of potassium ferrocyanide in aqueous solution are added, the stirring being continued meanwhile; Prussian blue is formed in an extremely divided state. When the reaction is completed, the solution is poured into water, the cellulose acetate is precipitated blue-colored, washed with water and dried.

Rosin Phenol Products. Arnold Doser and Alfred Thauss, of Cologne-Deutz, Germany, assignors to I. G. Farbenindustrie Aktiengesellschaft. U. S. P. 1,788,371; Jan. 13, 1931.

Example 1

A solution of 30 parts of colophony and 15 parts of phenol with the addition of 1.5 parts of sulfuric acid of 60° Bé. are heated to 70-80° C. during 8 hours. From the reaction mass the superfluous phenol is separated by steam distillation. The new compound is a viscous resinlike substance showing no more the Storch-Morawski reaction on colophony; (see Zeitschrift für angewandte Chemie 1927, Seite 100). A solution in acetic anhydride with the addition of a drop of concentrated sulfuric acid gives a reddish coloration. The condensation product is dissolved in carbon tetrachloride and sulfonated with 80 parts of sulfuric acid monohydrate during four hours at a temperature of about 10° C. The reaction mass is placed on ice and the precipitated sulfonated mass is pressed to form a cake of resin. It is dissolved in hot water and salted out, precipitating in form of brownish flakes, melting together to form a cake on heating.

New Condensation Resin Phenol Products. Arnold Doser and Alfred Thauss, of Cologne-Deutz, Germany, assignors to I. G. Farbenindustrie Aktiengesellschaft. U. S. P. 1,788,372; Jan. 13, 1931.

Example 1.—A solution of 30 parts of colophony and 13 parts of phenol with the addition of 1.5 parts of sulfuric acid of 60° Bé. are heated to 70-80° C. during 8 hours. From the reaction mass the superfluous phenol is separated by steam distillation. The new compound is a viscous resinlike substance showing no more the Storch-Morawski reaction on colophony; see Zeitschrift für angewandte Chemie 1927, Seite 100). A solution in acetic anhydride with the addition of a drop of concentrated sulfuric acid gives a reddish coloration. The condensation product is dissolved in carbon tetrachloride and sulfonated with 80 parts of sulfuric acid monohydrate during 4 hours at a temperature of about 10° C. The reaction mass is pressed to form a cake of resin. It is dissolved in hot water and salted out, precipitating in form of brownish flakes, melting together to form a cake on heating.

Treatment of Esters of Cellulose. Hugh McCurdy Spencer, of Newark, N. J. U. S. P. 1,797,843; Mar. 24, 1931.

Anhydrous or substantially anhydrous ethyl acetate is saturated with anhydrous or substantially anhydrous ammonia gas, the gain in weight being about 9%.

To 96 parts by weight of dry nitrated cotton add 5 parts by weight of the ammoniated ethyl acetate, 151 parts by weight of ethyl acetate, 308 grams of denatured ethyl alcohol and 23 parts of acetone.

If the ammoniated ethyl acetate has been only partly saturated with ammonia gas, an increased amount of this alkalinized peptizer or solvent, and a correspondingly decreased amount of ethyl acetate, must be added.

If the solution or colloidal dispersion of the esters of cellulose is desired, that contains a higher percentage of such esters of cellulose, then more of such esters of cellulose should be substituted in the above formula, together with less solvents or peptizers, liuents or thinners, excepting the ammoniated ethyl acetate, which should be increased more or less proportionately to the increase in the content of the esters of cellulose.

Similarly, if the decreased content of the esters of cellulose is desired in such a solution or colloidal dispersion, a decreased amount of the esters of cellulose should be substituted in the above formula, together with more solvents or peptizers, diluents or thinners, excepting the ammoniated ethyl acetate, which should be decreased more or less proportionately to the decrease in the content of the esters of cellulose.

Celluloid Substitute. Motomu Sugata, of Minami Katsushika Gun Tokyo Fu, Japan. U. S. P. 1,797,808; Mar. 24, 1931.

Method of manufacturing celluloid substitute, characterized by adding camphor to rosin, heating the mixture in a closed vessel to fuse it in sticky condition; mixing the same with the product obtained by boiling floss-silk, other silk or like fibre in dilute alkali solution so as to swell and glutinize it, suspending the same homogenously in alcohol or ether and mixing it intimately with magnesium carbonate or magnesium oxide; and

then heating and kneading the mixture homogeneously.

Production of Paracoumarone Resins. Edward Horace Ellms, assignor to the Barrett Co., of New York, N. Y. U. S. P. 1,797,260; Mar. 24, 1931.

A paracoumarone resin containing sodium sulfonates and sodium sulfate, the sulfonate ash being greater than the Na_2SO_4 present as such in the resin, and the total ash of which lies within the range of 0.3% to 1.9%.

An emulsifiable paracoumarone resin melting at 30° C. or above and containing sodium sulfonates and sodium sulfate, the sulfonate ash being greater than the Na_2SO_4 present as such in the resin, and the total ash of which lies within the range 0.3% to 1.9%.

In a process for producing paracoumarone resin, the step which comprises altering the quantities of sodium sulfonates and sodium sulfate present so that the total ash lies within the limits 0.3% to 1.9% and the ratio of sulfonate ash to sulfate ash present as such in the resin is not less than 10 in the case of low ash material, 1.5 in the case of high ash material, and a value varying substantially uniformly between these limits for intermediate ash contents.

Condensation Products of Urea and Formaldehyde. Martin Luther, Wilhelm Pungs, Robert Griessbach and Claus Heuck, assignors to I. G. Farbenindustrie Aktiengesellschaft, of Frankfort-on-the-Main, Germany. U. S. P. 1,794,084; Feb. 24, 1931.

Example 1

6 kilograms of urea, 200 grams of mono-sodium phosphate and 50 grams of di-sodium phosphate are dissolved in 5 litres of water while heating. The solution is slowly added to 18.75 kilograms of a 32 per cent formaldehyde solution. After evaporating the bulk of the water, the highly viscous condensation product is poured on a smooth plate and exposed to an atmosphere of sulfur dioxid. After some minutes, a hard superficial layer, which is no longer adhesive, has been formed. In case the plate of the condensation product has a greater thickness, it may be advantageous to employ a subsequent hardening by heat.

Resin from Chlorinated Toluol and Phenol. Carleton Ellis, assignor to Ellis-Foster Company. U. S. P. 1,793,311; Feb. 17, 1931.

One may treat 100 parts by weight

of the aforesaid syrupy or viscid material with 25 parts of ordinary (40%) aqueous formaldehyde corresponding to only 10 per cent of actual formaldehyde. This mixture may be boiled under a reflux condenser for 2 or 3 hours and the resulting resinous product then freed from water. In this form it may be dissolved in a solvent such as alcohol and incorporated with a suitable filler such as asbestos flour or fibre or other mineral filler or vegetable fibres such as linters, wood flour, cotton flock and the like. 5 to 10 per cent of hexamethylenetetramine based on the weight of the resin may be incorporated. The solvent is removed by evaporation, preferably in a vacuum dryer. The resulting composition is pulverized or ground and may then be placed in molds in a hot press and molded to suitable shapes. The setting takes place rapidly and in from 2 to 5 minutes, in the case of small articles a rigid product of good surface finish is obtained by molding at a temperature of 150-160° C.

Various coloring agents, dyes and the like may be introduced when special colors are required.

Synthetic Resin. Carleton Ellis, assignor to Ellis-Foster Company. U. S. P. 1,793,310; Feb. 17, 1931.

A resinous composition comprising the infusible reaction product of a phenol and benzotrichloride.

The process of making a resinous composition which comprises reacting on a phenol with benzotrichloride in the presence of a catalyst selected from the herein described group consisting of the chlorides of iron and aluminum, and thereafter reacting upon the resulting resinous material with formaldehyde.

The process of making a resinous composition which comprises reacting with toluol, chlorinated in the side chain and containing benzotrichloride, upon a phenol in the presence of a chloride of a metal selected from the herein described class consisting of the metals, iron and aluminum, to produce a resinous substance, and thereafter reacting upon the resulting resinous material with formaldehyde.

Synthetic Resin. Carleton Ellis, assignor to Ellis-Foster Company. U. S. P. 1,793,312; Feb. 17, 1931.

1128 parts by weight of phenol and 400 parts of ethyl alcohol were mixed and heated to 90° C., and then 780 parts of chlorinated toluol chlorinated in the side chain were slowly added. A vigorous exothermic reaction took place with the evolution of hydrochloric acid gas. The reaction was carried out under a reflux or return condenser to prevent loss of the more volatile constituents and the hydrochloric acid was suitably absorbed. After the chlorinated toluol had been added the resulting solution was maintained in ebullition by heating for a period of 2 to 3 hours or until hydrochloric acid gas was no longer given off. The secondary product thus obtained was a dark red, thick syrup or heavy oil and contain-

ed 0.2 per cent of free hydrochloric acid. The syrupy secondary product was then reacted with 30 per cent of its weight of aqueous formaldehyde (37 to 40 per cent aqueous solution) first, however, preferably acidifying with concentrated hydrochloric acid in order to raise the acid content of the secondary product to approximately 1 per cent. The acidulated secondary product and formaldehyde solution were boiled together for a period of one hour. After the solution had been boiled for the above period the aqueous portion was separated as completely as possible and the product heated to remove the remaining moisture. The now resinous product foamed considerably on the application of heat and it was therefore necessary to heat cautiously. During the heating a volatile water-insoluble material was distilled off. The heating was continued until the temperature of the resin reached 160° C. Hydrochloric acid is usually well expelled by this treatment but as a precaution in some cases an amount of caustic soda just sufficient to neutralize the hydrochloric acid may be added before drying and the resin washed to remove salts. When cold the product is a hard, brittle, clear red resin soluble in alcohol and other ordinary organic solvents. The yield of the secondary syrupy liquid was 80 per cent of the maetrial taken and the yield of resinous product after drying and removal of volatile matter by heating to 160° C. was 95.3 per cent of the secondary product.

45 parts by weight of the resin was dissolved in 45 parts of denatured alcohol and 4½ parts of hexamethylenetetramine was added. The alcoholic solution was then used to impregnate 55 parts of wood flour; the impregnation or mixing being carried out in a Werner-Pfleiderer mixer. The resulting composition was dried in a vacuum dryer in which the temperature was raised gradually to 100° C. The dried product on hot pressing gave a molded article which was satisfactory with respect to flow, rate of curing, surface finish and strength.

Producing Acetyl Cellulose. Samuel Isidoor Vles and Louis de Hoop, assignors to Algemeene Kunstzijde Unie N. V., of Arnheim, Netherlands. U. S. P. 1,794,126; Feb. 24, 1931.

4 kg. acetic anhydride are mixed with 4.5 kg. glacial acetic acid and this mixture is left standing for about 6 hours. 60 g. sulphuryl chloride are then added as condensation agent, whereupon the mixture is allowed to stand again for a few hours, care being taken, as in the first instance, that water or water vapour is excluded. 1 kg. cellulose having a moisture content of 6% is then immersed in the mixture produced in the manner referred to. The acetylation takes place at 60° C. and requires about 6 hours. The solution produced in this way is worked up in a known manner, either by precipitating the resulting cellulose compound, dissolving in a volatile solvent and

spinning in an atmosphere which may be heated if desired, or by directly spinning the solution in a suitable precipitation bath or by working up into plastic masses.

Stencil Blank. Daniel A. Williams, assignor to A. B. Dick Company, of Chicago, Ill. U. S. P. 1,795,461; March 10, 1931.

Example No. 1

Nitro cellulose or cellulose acetate	1-10%
Acetone	225.0
Benzol	75.0
Alcohol	60.0
Triacetate	10.0
Tetrachlorethane	4.0
Triphenyl phosphate	10.0

Example No. 2

Nitrocellulose or cellulose acetate	12.6
Acetone	225.0
Glacial acetic acid	135.0
Resin or other gums	2.7
Glycerine	45.0

Furfural-xylenol Resin. Emil E. Novotny, assignor to John Stogdell Stokes of Spring Valley Farms, Huntingdon Valley P. O. Penna. U. S. P. 1,793,715; Feb. 24, 1931.

Xylenol, commercial grade, 32 parts; furfural, commercial grade, 24 parts. Boil mixture in a digester provided with suitable distilling condenser and separator. Carry out the distillation in such manner that water of solution and synthetic water formed will be removed with the vapors of the reacting ingredients. Maintain the temperature of the reacting mass at between 360 and 380° F. for approximately 7½ hours or for a longer length of time if a harder variety of product is desired. Under the conditions mentioned, however, there will be removed approximately 3 parts of water. The reacting ingredients are returned to the digester. The resin thus formed is potentially reactive but is slow-setting and can at this point be intermixed with various hardening agents such as hexamethylenetetramine, polymerized formaldehyde, furfuramid, furfural, etc., to speed the reaction of the product when it is to be subsequently hardened.

However, it is preferred to actually combine the active methylene radical with this resin product in the following manner: The product in the kettle is cooled to approximately 180° F., the condenser is placed in the reflux position and there is added to the digester contents 10 to 30 parts of 37 to 40% formaldehyde. Heat is again applied and the mixture is boiled while refluxing for from 1 to 2 hours. The condenser is now connected for distillation and the separator is not used. The distillate is discharged into a container and weighed. When 15 parts of distillate have been removed when 20 parts of formaldehyde had been used the digestion is completed. The temperature of the digester contents will be about 258° F. At higher temperatures of say 300° F. or over precautions are necessary as the material may suddenly go infusible.

Advertisers' Index

Classified Advertisements

And Now, In Closing:

THIS seems to be "publicity month" . . . articles on plastics have appeared in The *Saturday Evening Post*, The New York *Herald Tribune*, The New York *Sun* and the *Architectural Record* . . . and the *London Times* published a special thirty-two page supplement on the subject (March 28) . . . and *Fortune* will soon print another . . . not bad! . . . Among the signs of an early spring: Leviton start their own, Belden retire from the custom molding game (Chicago Molded takes Stratton and the contracts), Durium (records) voluntarily go to the Irving Trust Company, lots of talk on the biggest molding job in history . . Speaking of the latter, we heard of a single order, taken some time ago, that called for $440,000. worth of Bakelite and $9,000. worth of molds! . . . when "better orders are taken, B. will T. them" . . . Remember Felix Homberg? His Reading equipment was sold to a used machinery company . . . E. G. Loomis of Newark has been on a trip around the World and just returned . . . Since leaving Celluloid, Benn Budd has been with American Insulator . . . their New York office is now on the tenth floor Graybar . . . Boonton Molding have redecorated their offices . . . Ben Conner's office is now on the corner, directly opposite the main plant . . . incidentally, it is over the Blower Company...For "Bill" Spencer: some of the midget radios *are* molded . . . Contrary to a letter from the G. S. & H. Company, New York, the Chemical Exposition is not being held under our auspices! . . . We are, however, sponsoring the program given on the inside front cover of this issue . . . Hope to see many of you then, not only at Booth 436 but at the Speakers' Room . . .

THE Chemical Exposition, held every other year at the Grand Central Palace in New York, has become the only exhibition place in this country for the Plastic Industry. True, there are other "shows" and conventions where the enterprising manufacturer of plastics may reach a definite audience, but these have been only secondary in importance. This "Chemical Show," which will open on May fourth, is the only central meeting ground. There, a production man can follow his product from its chemical stage, through its manufacturing evolution in fine machinery, down to the finished article, packaged and ready for the buyer. And the industrial buyer, on his part, can determine the relative merits of these respective processes and products, carefully checking one against the other, and leaving with a final picture he could never obtain interviewing salesmen in the home office. It is an Exposition of Progress, and as such it should come first in the list for those in this industry.

It does come first, as you will see by referring to the list of exhibitors in this issue. Yet we have often felt that these exhibitors should rightly be in one section, giving visitors an even clearer picture of this industry and its products. This is done, we believe, with great success in Great Britain, and we earnestly hope that two years from now such a section will be developed in this country for the next Chemical Exposition.

AND speaking of expositions, we herewith move that the Plastics Industry begin now to plan participation in the Chicago World's Fair.

BUSINESS is still spotty, still recuperating, still looking back. It may be that way for some months to come, and many authorities are outspoken in their belief that we are far away from good times, as we knew them two years ago. The business man, cigar in mouth and feet on desk, who says, in the words of the radio "Japanese Schoolboy," "What to do, what to did?" might, first of all, pay more attention to the lessons taught every day in his own shop and his own trade-paper. Then, he could learn from the house-organs. We reprint the following from the Durez Molder as being an excellent sample.

"We're a young nation, we think a lot of comforts, luxuries, undreamed of in other parts of the world. It has spoiled us for the hardships our grandparents considered every day events. We now find ourselves just pulling out of a depression, with not so much to be depressed about.

We are the richest nation on the earth. We operate 43% of the world's railroads, 76% of the automobiles, we manufacture 42% of its steel and our own population is but 6.5% of the world, but we do an export business of 14%, we own 40% of the gold. We do most of the advertising and operate too many of the world's movies, radios, soda fountains and speakeasies for our own and our children's good.

We ought to be the world's happiest people. We ought to think more of futures, individually and collectively. We ought to think more of preparedness, both for peace and for war and not depend entirely upon our faith, that because we are Americans it is sufficient. May the past and the present prove profitable lessons, not just experiences."

We not only welcome our readers to our Booth at the Chemical Exposition, but we extend a cordial invitation to them to meet with us in the Speakers' Room on the same floor on both Wednesday and Thursday afternoons of "Chemical Week."Three o'clock is the time, and the subjects, as printed on our inside front cover, show ample reason for attending. For your own instructions, it should pay you to listen to these authorities.